SCIENTIFIC AMERICAN

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THE INDUSTRIAL SOUTH—TALLAPOOSA, GA.

Leaving Washington at 11 P. M., the traveler is due at Atlanta, Ga., at 10 the following night, making the run of 648 miles in less than 24 hours. The journey is over the Piedmont Air Line, a portion of the great Richmond and Danville system, heavy steel rails and

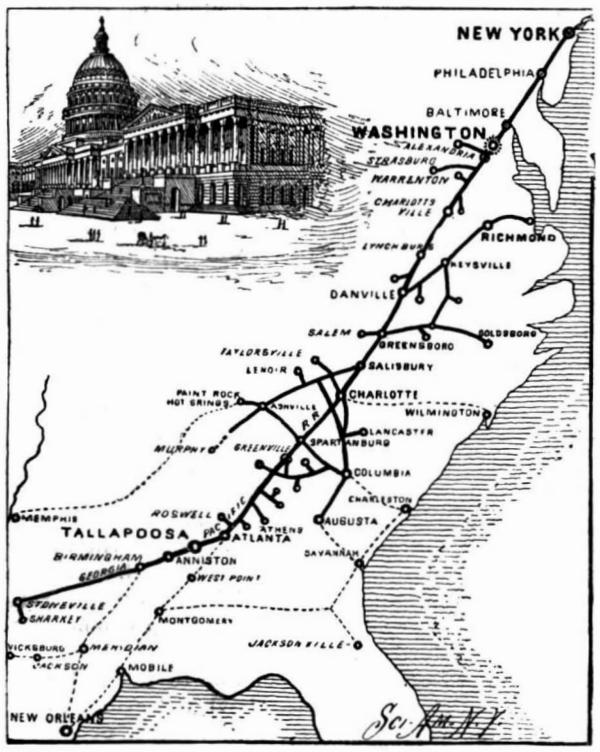

Fig. 1.—HOW TO REACH THE NEW SOUTH.

stone ballasted throughout. A correspondent of the SCIENTIFIC AMERICAN says: "To one who has never seen this section of our country, the trip is a revelation. Progress and improvement are everywhere indicated. Iron bridges have replaced the wooden. Between Atlanta, Ga., and Charlotte, N. C., the entire distance was covered at a rate exceeding 42 miles an hour. As shown by the accompanying map, many of the important places in the South, to which public attention is now attracted, are reached by this route.

"Tallapoosa, in the language of the Cherokee Indians, signifies 'Golden River,' and this name rightly belongs to the place. For ages the washings from the mountains have carried rich deposits of gold into the adjoining creeks flowing into the Tallapoosa River, and these deposits can be readily found with the miner's pan. Tallapoosa might be termed properly a mountain city, as it is located in the highlands of northern Georgia on the Piedmont plateau, 1,200 feet above the sea level. The land is not level, but rolling, and there is not a spot within the city limits or for miles around where water stands or becomes stagnant. This affords natural drainage, and half an hour after a heavy rain the surface water has disappeared and there is no mud. The river, a clear mountain stream, 2½ miles from the city proper and 100 feet below it, encircles it on the northwest and west sides, and this, with Walker's Creek on the east, thoroughly drains the entire place. The city is shaded with almost every variety of deciduous trees, such as oak, walnut, maple, holly, chestnut, wild cucumber, and magnolia.

Fig. 2.—TALLAPOOSA BLAST FURNACE—CAPACITY, 50 TONS A DAY.

"The climate of Tallapoosa, both for summer and winter residence, is unequaled. The average temperature in the summer of 1889 was 76 degrees, while but once did the thermometer reach 92 degrees. The nights during the summer are invariably cool, and it is the exception when a blanket is not needed."

Our correspondent continues: "We have made a careful investigation of the advantages of Tallapoosa, visiting it twice within the last three months, and have not been able to find any location that could compare with it in bracing air, clear water, and rolling ground, which gives natural drainage and adds so much to the landscape.

"The Georgia Pacific Railroad laid its tracks through the place in 1884, and in 1887 it had but 400 inhabitants, and these located in what is now called Oldtown, nearly a mile from the present center. In 1887, the Tallapoosa Land, Mining, and Manufacturing Co. secured 2,500 acres of desirable property in and surrounding the city and over 3,000 acres of mineral land adjacent, and commenced an extensive system of improvements and developments. Streets and avenues have been laid out and graded, and factories erected, until to-day Tallapoosa is one of the wonders of the new South. Active work in securing population from the North was not begun until about eighteen months ago, and the place in that time has grown from 700 to nearly 3,500, and the factories now in operation and approaching completion will require the employment of hundreds of additional people. The population of the city will be at least 5,000 by the end of the present year.

"The following record of the past eight months in locating new industries is remarkable, many of them being now in active operation:

	To employ.
Iron furnace	150 hands.
Cotton mill and bleachery	150 "
Edison electric light plant	10 "
Jeans and overall factory	50 "
Foundry and machine work	50 "
Soap factory	50 "
Cotton hosiery mills	125 "
Pressed brick works	25 "
Tallapoosa distillery	25 "
Glass works	100 "
Tallapoosa Cabinet Company	75 "
Tallapoosa Reclining Chair Company	75 "
Tallapoosa cigar factory	25 "
Tallapoosa Knitting Manufacturing Company	135 "
Tallapoosa Blacking Manufacturing Company	15 "
Tallapoosa bolting works	10 "
Tallapoosa city water works	10 "
	1 080

"Making a total of 1,080 hands that will be employed when all of the factories that are now in operation and are being built are running.

"The Tallapoosa furnace has a capacity of from 40

(*Continued on page* 345.)

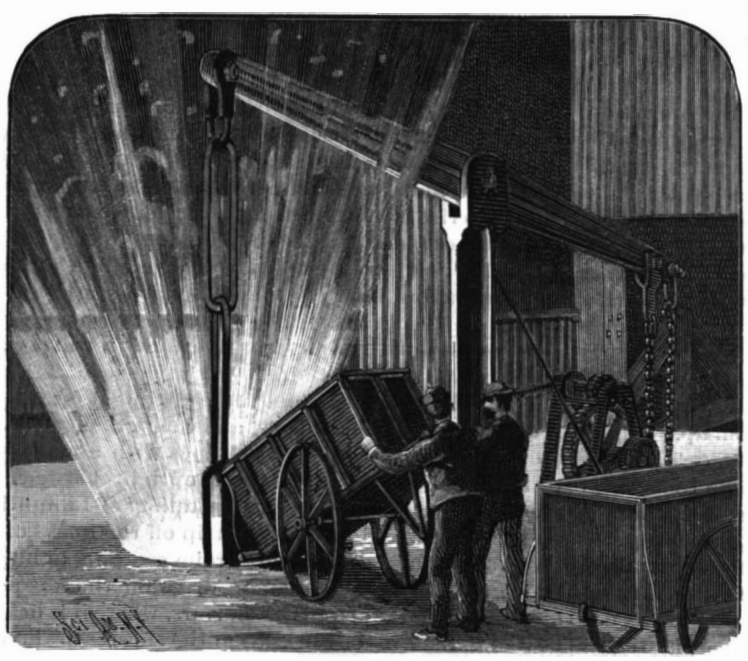

Fig. 3. TALLAPOOSA BLAST FURNACE—CHARGING THE FURNACE.

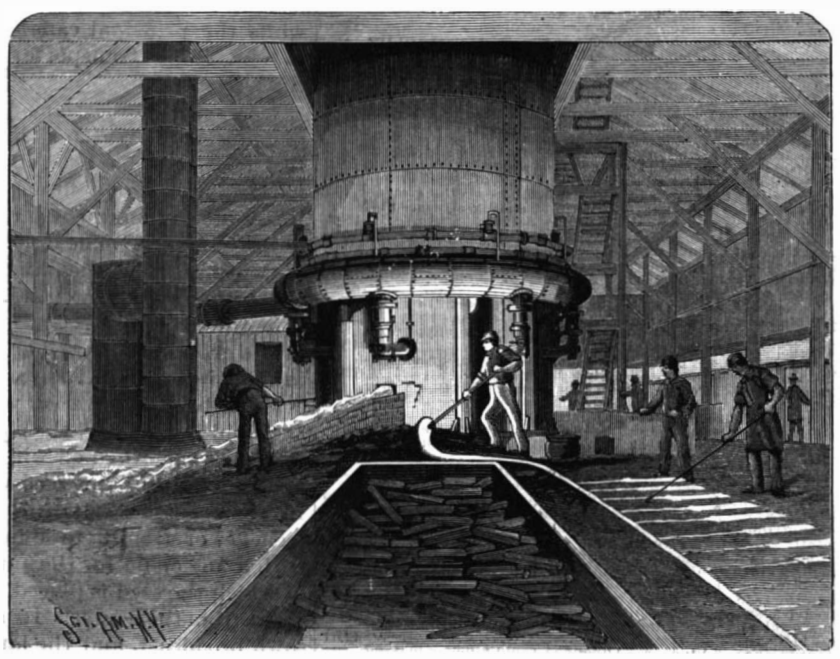

Fig. 4.—TALLAPOOSA BLAST FURNACE—MAKING A CAST.

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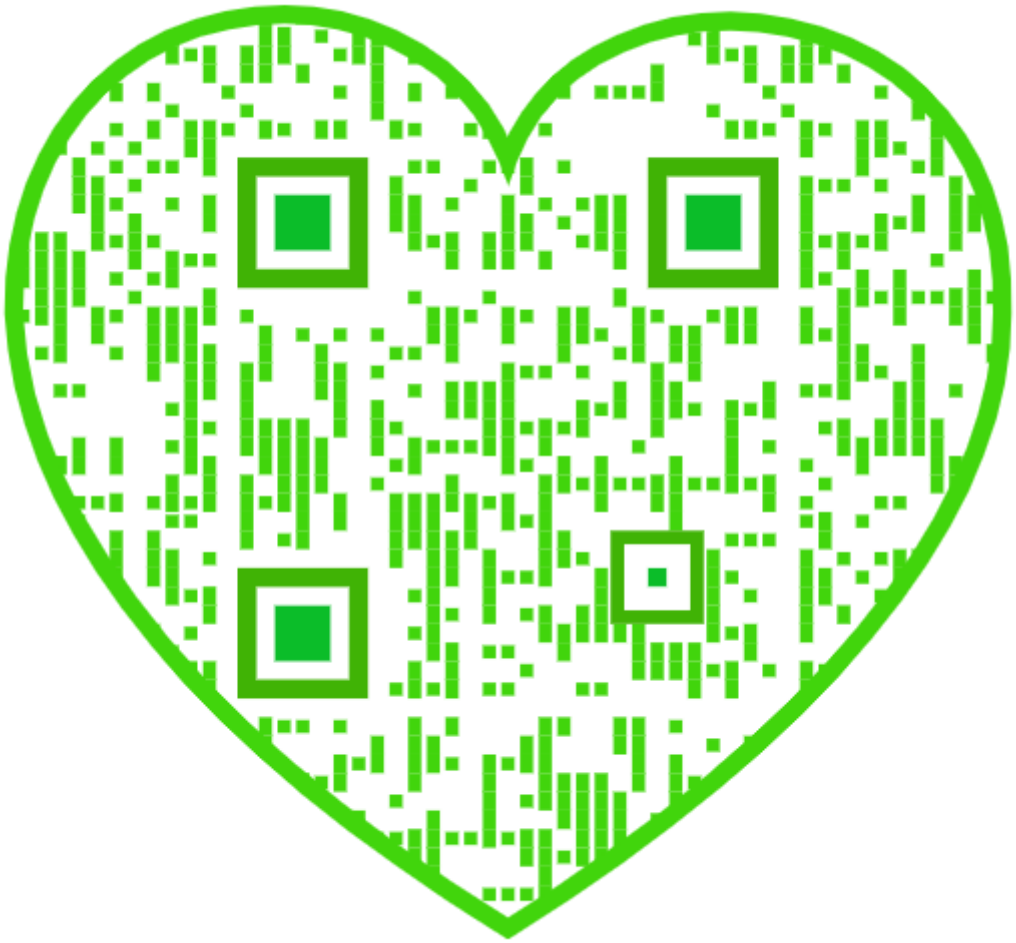

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A WEEKLY PAYMENT LAW IN NEW YORK.

Complaints have often been made of the inconvenience to which employes in manufacturing establishments are subjected by the irregularity and delays in the payment of wages earned. To correct abuses in this direction, a new law has been passed by the legislature of the State of New York.

The provisions of the law are very sweeping. Every manufacturing, mining or quarrying, lumbering or mercantile, railroad (surface, street, electric, and elevated), except steam surface railroads, steamboat, telegraph, telephone, and municipal coporation, and every incorporated express and water company, must, after July 1 next, pay weekly each of its employes. If any employe shall be absent on the regular pay day, he shall be entitled to the money due him upon demand. The penalty for failure to comply with this law is fixed at not more than $50 nor less than $10 for each violation. Actions for violations must be begun within thirty days.

The factory inspectors are empowered to begin suit against any corporation which fails to observe the law two weeks after notification. On the trial of the action the defendant shall not be allowed to set up as a defense other than a valid assignment of wages, the absence of an employe on pay day, an actual tender of payment to an employe, a breach of contract, or a denial of employment. No assignment of future wages shall be valid if made to the employing corporation or its agents, and corporations are forbidden to require any agreement from any employe to accept wages at other periods than this law contemplates.

RICE CULTURE.

It is said that rice furnishes the principal food of three-quarters of the human race. Originally a native of the East Indies, it is now cultivated in all quarters of the globe where the conditions of warmth and moisture are suitable. Governor Alston, of South Carolina, stated in an agricultural address delivered in 1854 that a ship from Madagascar came into Charleston harbor about the close of the 17th century, and left rice seed there which was planted and prospered. Another account of the origin of rice culture in this country states that it was first grown by Sir William Berkeley, in Virginia, as early as 1647.

In 1666 the advantages offered by the lowlands of South Carolina for the cultivation of this grain were noted by agents of the English interested in the settlement and improvement of the new world, and they stated in their report that "the meadows are very proper for rice, rapeseed, linseed, and many of them be made to overflow at pleasure with a small charge."

Following the introduction of rice in this country its cultivation extended throughout most of the southern States of America, and it has also been successfully grown in Tennessee and Missouri.

The Carolina rice fields are subjected to extreme irrigation, and in fact swamp lands were considered the best for the cultivation of the cereal, but lands which are subject to tidal overflow of fresh water have latterly been found to give the best results.

In Louisiana the method pursued is very similar. The planter locates on ground having an inclination backward from the river. In the case of the Mississippi, the water rises above the level of the rice fields, from which it is protected by the levees. The planter is allowed to cut openings in the levee, which are called flumes, through which the water passes to the rice fields. The flumes are arranged with gates which can be opened or closed at will, and thus the discharge of the water is regulated. The water after passing through the flumes flows into ditches which are supplied with laterals, which divide the field into sections and are supplied with dams, and these secure the distribution of the water as it is needed. Methods of irrigation vary in different localities, but the ditches are usually five feet deep and of about the same width, while the principal canal is sometimes wide enough to be used for transportation between the fields and the barns.

Very serious objections are made to the practice of piercing the levees for the purpose of irrigating the rice fields, as it has been shown that the aperture made for the location of a flume frequently causes a serious break in the bank, which results in flooding the neighboring country. The difficulty could be overcome by dispensing with the use of flumes and employing pumps for taking the water from the river and placing it in the ditches.

The ground is plowed or dug over with a hoe early in the winter, and at certain times when the weather is favorable it is covered with water. During March the land is kept dry, the clods are broken up, and the surface is smoothed off with harrow or hoe. The manner of planting the seed varies according to locality. In some cases seed drills are used, and in others trenches of from 3 to 5 inches in width are prepared with a hoe made for the purpose, and these trenches, in which the seed is placed, will be from 13 to 15 inches apart from the center. In still other cases the seed is sown broadcast, and the larger part of the planting is done during March and until the middle of May. The amount of seed required is 2 to 2½ bushels to the acre. The drills cover the seed as it is dropped into the earth, a hoe is used to cover it lightly with earth when it is sown by hand in the trenches, and it is harrowed in when sown broadcast. After the seed is thus planted the water is let in through the gates and remains upon the land from four to six days or until the grain swells and commences to sprout. Sometimes the seed is not covered with earth when sown, and it is then prepared by stirring it in clayey water and drying it when enough clay adheres to keep it from floating off when the water is let on. Where the seed is covered with soil, two floodings at sprouting time are required; but where the process of mixing the grains with clayey water is pursued, but one flooding is necessary.

Seed prepared in the manner just stated has been sown upon the surface of the water, the clay adhering to it, sinking it to the bottom, where it took root and grew.

The water, after standing from four to six days on the sprouting rice, is drained off, and when it is five or six weeks old, where the grain has been sown in trenches, the earth is stirred with hoe. This is repeated ten days later, and then what is called the "long water" is put on for about two weeks, which is kept at a considerable depth for four days, and then is made to diminish gradually. After the water has been drawn off about eight days and the field has become dry, it is hoed to a considerable depth. When a joint appears on the plant the land is lightly hoed again, and then what is known as the "joint water" is put on, which remains until the grain matures, which requires about two months. During the time that the water is upon the crop it has to be frequently renewed, as the evaporation is very great. Much care has to be taken that no salt or even brackish water reaches the growing crop, as it is fatal to it. In localities where the water used in irrigation is likely to be impregnated with salt by the incoming tide from the ocean, men are stationed at the flumes, who taste the water as it flows through, and the moment salt is discovered the gates are closed. While the water is upon the crop the hands are obliged to wade about in it and pull up or destroy the weeds or grapes, which grow luxuriantly in the rich soil. The maturity of the grain is indicated by its turning yellow, and a few days before the harvesting commences the water is drained off.

Rice grows to a height of from four to five feet, and it is cut about eighteen inches above the ground, and is spread upon the stubble to cure, which generally takes about twenty-four hours. In cutting the grain, the sickle is used, also the cradle, and the attempt has been made to employ reaping machines, but they have been found to be too heavy to run upon soil made soft by irrigation. It is thought, however, that a lighter machine with a broad-tired wheel might do the work successfully.

Rice is also grown on uplands and without irrigation, and the grain thus obtained is in some respects superior to the lowland product, although the upland and lowland rice are of the same species, the differences being but modifications of the varied cultures, which differ with the soil and the localities. In cultivating upland rice, the best results are obtained where it is sown in rows like fodder corn, where it can be hoed and kept free from weeds. It is also sown broadcast like wheat, oats, and other grains, and in loosening the soil and freeing it from weeds, an implement about half the size of a scythe is used, and which is called a grasping knife. The method of reaping the upland rice is similar to that which has already been described. Upland rice yields from twenty-five to forty bushels to the acre, and lowland, where irrigation is used, fifty to seventy-five bushels to the acre. One great advantage of lowland culture is that the lands thus used would not yield any other crop, and the area of land in the South which might be devoted to the culture of rice is almost unlimited in extent. When fully cured, rice may be said to occupy in appearance a position intermediate between barley and oats.

The grain is thrashed by machines usually run by horse power, the old-fashioned flail being now but little used. When it comes from the thrasher it is known as rough rice or paddy, and requires grinding to free it from the hulls, according to the following method. After the rice is screened from sand, it is passed through buhr stones about five feet in diameter, to grind off the husks. These stones are not grooved like ordinary mill stones, but have level faces, set as far apart as the length of the grain, with concave depressions in the center where the grain is fed, the stones revolving at a speed of about two hundred.

When the grain is fed in, the centrifugal force sends it circling to the periphery, and each grain, revolving on its shortest axis, in accordance with a well-tested principle of philosophy, travels upright between the stones, the mass moving like battalions of Lilliputians on the march, and the stones strip off the husks of all the grains touched, the short grains escaping unhulled. The grain is next fanned to drive off the separated husks and then taken to the mortars, where it is heavily beaten to remove the husks from the shorter grains and such others as have not been completely cleaned by the

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stones. These mortars are either of wood or iron. The pestles weigh from 250 to 350 pounds each, and are of iron or wood shod with iron, and are moved as in the common stamp mill by cams or levers passing through slots in handles. The grain is there pounded from 40 to 70 minutes, a more protracted pounding being fatal to the integrity of the unbroken kernels. The last named process is extremely primitive, and it has even been called barbarous, for it does not differ essentially from that in use by cannibal tribes. Dr. Schneider, in his "Life among the Battas of Sumatra," says: "The rice which is the principal food of the people is always kept in the hull and thrashed out day by day as it is needed. The thrashing is done with hard wood pestles eight or ten feet long in wooden mortars made from a stump or log." The process most used in this country is the same as was introduced by Dr. Calvin Emmons in 1812, having the pestles shod with sheet iron and serrated by iron wires, which break more or less of the grain, rendering it unfit for market as first-class rice.

After the rice is hulled it is passed through an inclined revolving cylindrical wire screen, the gratings of which grow coarser toward the lower end. It is thus assorted into a number of products. At the upper end of the screen the flour passes through, next the eyes and small pieces of broken rice, then the "middling rice," which consists of larger fragments of the smaller grains, and lastly the prime rice, or best and mostly unbroken grains. The prime rice as it falls through the screen descends to the "polishing" or "brushing screen," which is a vertical cylinder laid up and down with shreds of sheep skin, and made to revolve rapidly within a wire screen. The rice falling down in the space between these is swept free of the flour which adheres to it, and is discharged below in a perfectly clean and polished condition.

The hulling of the rice, including that which requires the use of the stones, the pestles, and mortars, as well as the polishing, is all done at the rice mills, which are run by steam or water power, and of which there are only about twenty-five in the United States. These are located at Charleston, Savannah, New Orleans, and at other centers of rice culture. All the rice which is produced must be sent to the mill to be hulled, polished, and thus made ready for the market, though the product is sometimes shipped to New York, as well as to Europe, in the hull, and is subjected to the process of separation at the place of destination.

A small rice mill has been invented by a Brazilian, which is now being manufactured and introduced in this country. It is three feet square and five feet high, and has a capacity of 80 to 150 bushels a day. This machine will take the rice in the hull, or rough rice, as it is called, and prepare it for market, excepting that it cannot polish it. It leaves upon the grain the outer skin, which, as it contains gluten, adds materially to the nutritive qualities of the rice. Usage, however, demands that the rice should be polished, which makes the grain more attractive to the eye, but really renders it less nutritious.

Were it not for the polishing requirement, which can only be done at the large mills, which are often located many miles from the plantation, each farmer could hull his own rice with one of the small machines, and thus much time and expense of transportation would be saved.

Improvements in the methods of rice culture have not kept pace with those in other departments of agriculture; in fact, the course generally pursued is of the most primitive character. The crop, however, is more profitable than wheat, and vast tracts of cheap land in parts of Louisiana, Texas, Alabama, and Mississippi could be utilized in the cultivation of this cereal. In Louisiana the cost of production per acre is from $20 to $28, and the average yield is 45 bushels. It can be sold for from 75 cents to $1.25 per bushel, according to quality and the season.

If more rice were grown the price would be lower, and it would then be more generally used for food. Large quantities of it are imported every year, as the home product is not sufficient to supply the demand. The figures given below show the quantity raised in this country and that which was imported since 1881:

	Foreign.	Domestic.
1882	351,100 bags.	390,000 bbls.
1883	378,300 "	325,000 "
1884	333,600 "	410 000 "
1885	246,400 "	600,000 "
1886	208,000 "	615,000 "
1887	410,000 "	448,000 "
1888	491,000 "	
1889 to June 1, 1890	Not complete.	Estimated 515,000 "

With the invention of better machinery for cultivating rice and preparing it for market, and the exhibition of more energy and enterprise by the planters, a department of agriculture will be developed which will be very profitable to those engaging in it, and which will add greatly to the wealth of the country, and at the same time cheapen a nutritious and healthy food.

OXALIC acid dissolved in water and mixed, if desired, with a little tartaric acid will remove ink stains from white paper.

POSITION OF THE PLANETS FOR JUNE.

MARS

is evening star. The radiant planet, under his present conditions, has a majestic bearing as he treads his starry path over the celestial highway, rising, on the 1st, before the sun sets, and reaching the meridian at 11 h. 26 m. P. M. A glance at the southeast in the early evening will reveal his presence, his ruddy color distinguishing him from the other planets. Mars is nearest to the earth on the 5th, continues to retrograde during the month, and is in conjunction with Beta Scorpii on the 7th, being about 2½° south.

Mars sets on the 1st at 3 h. 56 m. A. M. On the 30th he sets at 1 h. 34 m. A. M. His diameter on the 1st is 20".8, and he is in the constellation Scorpio.

VENUS

is evening star. She increases in size and brilliancy as she approaches the earth, and charms every observer who beholds her as she makes her way westward, being visible for two hours after sunset. The evening star and the crescent moon will form a lovely celestial picture on the evening of the 19th.

Venus sets on the 1st at 9 h. 21 m. P. M. On the 30th she sets at 9 h. 30 m. P. M. Her diameter on the 1st is 11".6, and she is in the constellation Gemini.

JUPITER.

is morning star. He is finely situated for observation, as he rises soon after 11 o'clock in the southeast, on the first of the month, and soon after 9 o'clock at its close. Jupiter and Venus are both above the horizon for a short time on the last few evenings of the month, the one rising a few minutes before the other sets.

Jupiter rises on the 1st at 11 h. 16 m. P. M. On the 30th he rises at 9 h. 18 m. P. M. His diameter on the 1st is 41".4, and he is in the constellation Capricornus

SATURN

is evening star. He is now moving easterly or in direct motion, and when the month closes it will be easy to see that he is receding from Regulus. He is on the meridian, on the 1st, at 5 h. 22 m. P. M., so that he must be looked for in the west.

Saturn sets on the 1st at 0 h. 8 m. A. M. On the 30th he sets at 10 h. 19 m. P. M. His diameter on the 1st is 16".6, and he is in the constellation Leo.

MERCURY

is morning star. He reaches his greatest western elongation on the 24th, at 1 h. A. M., when he is 22° 21′ west of the sun, and visible to the unaided eye as morning star. He is in conjunction with Neptune on the 10th, being 2° 38′ south.

Mercury rises on the 1st at 4 h. 27 m. A. M. On the 30th he rises at 3 h. 14 m. A. M. His diameter on the 1st is 12".0, and he is in the constellation Taurus.

URANUS

is evening star, holds nearly the same position northeast of Spica, and is visible to sharpsighted observers. He is one of the six planets visible to the naked eye during the month, the others being Mars, Venus, Jupiter, Saturn, and Mercury.

Uranus sets on the 1st at 2 h. 10 m. A. M. On the 30th he sets at 0 h. 15 m. A. M. His diameter on the 1st is 3".8, and he is in the constellation Virgo.

NEPTUNE

is morning star. He rises on the 1st at 4 h. 12 m. A. M. On the 30th he rises at 2 h. 22 m. A. M. His diameter on the 1st is 2".5, and he is in the constellation Taurus.

Venus, Saturn, Uranus, and Mars are evening stars at the close of the month. Jupiter, Neptune, and Mercury are morning stars.

History at the University of Pennsylvania.

The University of Pennsylvania is almost the only institution of learning in the world which has a professorship and a course devoted to the history of the United States. When the Wharton School of Finance and Economy was established, American history was expressly laid out as a branch of the instruction. Some years later, with the advent of Professor John Bach McMaster, whose "History of the People of the United States" has given him a national reputation, a new impetus was given to the course in American history at the university, until now it stands high in value and in popular favor.

The theory of Professor McMaster's instruction is perhaps as unique as the college's stand with regard to this special branch of general history. Text books are eschewed altogether, lectures and a printed syllabus taking their place. Students are referred, wherever it is possible, to original documents for their information, and maps and diagrams are always required to accompany the theses which are from time to time prepared by the members of the classes, the professor holding that historical knowledge which cannot be illustrated by means of a map or diagram is not knowledge at all. It is hoped that before long the Wharton School can be equipped with a lantern and complete set of historical slides, thus doing away with the use in lectures of ponderous and time-worn maps. The earliest contributions from those interested in the university's departure in the branch of history will probably be applied for this purpose.

PHOTOGRAPHIC NOTES.

Water-Developing Plates.—The following is the formula used by Dr. Backelandt for coating the backs of his water-developing plates:

Pryogallic acid	154 grains.
Salicylic acid	15 "
Gum or dextrine	154 "
Alcohol	1 fl. dr. 21 minims.
Water	5 fl. drs. 25

This is allowed to dry at the ordinary temperature. Development takes place by immersion in water with the addition of a very small quantity of ammonia.—*Photo. News.*

The Acid Eikonogen Developer.—It has been found by some experimentalists that the keeping qualities of the eikonogen developer are much improved if it is made acid, or nearly so. With regard to this, the following formula is recommended by Mr. T. H. Voigt, chairman of the Photographic Society of Frankfort-on-Main:

Solution No. 1.

Water	500 c.c.
Sodium sulphite	25 grammes.
Eikonogen (previously pulverized)	5 to 6 "

As soon as the eikonogen has completely dissolved, 20 c.c. of a mixture of 500 c.c. of a saturated solution of sodium sulphite and 40 c.c. of hydrochloric acid are added to the above (Solution No. 1).

Solution No. 2.

Water	500 c.c.
Carbonate of soda	20 grammes.
Carbonate of potash	5 "

To develop a cabinet plate, 30 c.c. of solution No. 1 are poured over the plate in the dish, and the latter is well rocked, so that the plate is entirely covered by the solution. Previously, 10 c.c. of solution No. 2 have been poured into a measure; if it is probable that the plate has been over-exposed, at first 5 c.c. of solution No. 2 are added to the developer in the dish; if, however, it is found that the plate has been correctly exposed, the remaining 5 c.c. of the alkali solution are also added. It will be noticed that with this method of development only about one-third the quantity of the alkali which is usually taken is used. It seems that the minute quantities of the chloride of soda and chloride of potash which are formed by the addition of the hydrochloric acid increase the energy of the developer.—*H. E. Gunther, in Photo. News.*

Monument to Marshall, the Finder of Gold in California.

On Saturday, May 3, the statue of James W. Marshall, the discoverer of gold in California, was unveiled at Colomo, El Dorado County, near the spot where the first gold was found. The Legislature provided the funds for this monument, which was designed by F. Marion Wells, the accomplished sculptor, who has executed his task with skill.

The statue represents Marshall in the dress of the period. He is facing the river. In his right hand he holds a golden nugget, while with his left index finger extended he points to the exact spot where the ever memorable discovery was made. The statue is grand in proportions and workmanship, and the design is quite historical.

The monument is 39 feet 6 inches in height, and is of admirable proportions. The cap of the pedestal is 5 feet square, on which the statue of Marshall is placed. The statue is heroic in size, being 9½ feet in height, representing Marshall dressed in miner's garb.

On the west side of the monument are the words: "Erected by the State of California, in memory of James W. Marshall, the discoverer of gold. Born October 10, 1810. Died August 10, 1888. The first nugget was found in the race of Sutter's mill, in Coloma, January 19, 1848."

MIXTURE FOR TOYS.—Fine ground argillaceous slate 50 per cent, rag paper paste 20 per cent, and 30 per cent of burnt plaster are mixed with the necessary volume of water to form a paste, which is then cast in moulds, the moulds having been previously daubed with finely ground slate, powdered plaster, or fat. A sufficiently thick crust will form in a few minutes, when the residuum of the mixture must be poured out of the mould. The mixture, which is unbreakable, hardens very rapidly. The castings thus produced may be immersed in paraffin or stearine, or they can be japanned. In the latter case it is desirable, so as not to consume too much paint, to first apply a coat of quick-drying boiled oil, and when the oil has become hard the article is to be painted.

Vaseline Harness Composition.

Prussian blue, in fine powder	¾ oz.
Lampblack	4 "
Treacle	2 "
Soft soap	2 "

Mix together in a large Wedgwood mortar, previously warmed, and add—

Vaseline	6 oz.
Cerasin	5 "
Yellow resin	½ "

Melted together; then sufficient turpentine to give the composition the proper consistency. Mix thoroughly.—*Chem. and Drug.*

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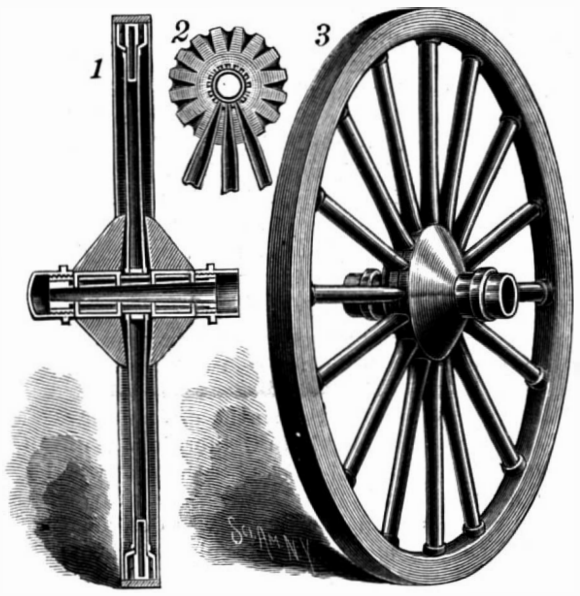
AN IMPROVED BAG FILLER AND HOLDER.

The accompanying illustration represents a device movable from place to place on wheels, to be used for filling bags with grain, etc., and of such construction that the grain may be shoveled up and loaded in the bag as shoveled. It has been patented by Mr. D. G. Stone, of Negaunee, Mich. The engraving shows the device in upright and in inclined position, the latter position facilitating the filling of the bag, an inclined face of the hopper constituting a shovel in contact with the ground or the floor on which the grain is placed. The foot portions of the rear standards are adapted to be utilized as handles, while the forward part of the frame is supported upon small wheels. Upon the standards is a table, with an opening at one side of its center surrounded by a hopper having an inclined front, a slideway within the hopper leading from the point where the inclination commences to the front side of the central opening of the hopper. There is a slide damper for closing this opening when desired. To the under side of the table, around the opening, is secured a band having downwardly projecting teeth, and beneath this band is hinged another having recesses adapted to receive the teeth, the edge of the bag being held between these bands, which are clamped in locked position by a latch. Upon the lower cross bars of the frame is pivoted a tilting platform, at or near the rear edge of which is a hook to which the lower end of the bag is attached when placed in position to be filled. Thus the bag may be filled through the hopper in the usual way when held in the upright position, or it may be held horizontally so that the hopper can be pushed forward into the grain, the shovel mouth of the hopper facilitating the inflow of the grain, and the device being tilted backward occasionally till the small wheels strike the floor with a jar, to throw the contents back from the mouth of the bag. This is repeated until sufficient grain has been taken up, when the frame is readily brought to upright position, through the operator bearing with his foot against the axle of the small wheels and taking hold of the rear standards midway of their length, and the bag released by lifting the spring latch, the tilting platform facilitating the ready removal of the bag. Upon an axle centrally on the front standards are large wheels, the construction being such that the filled bag may be easily conveyed at will from place to place.

STONE'S BAG FILLER.

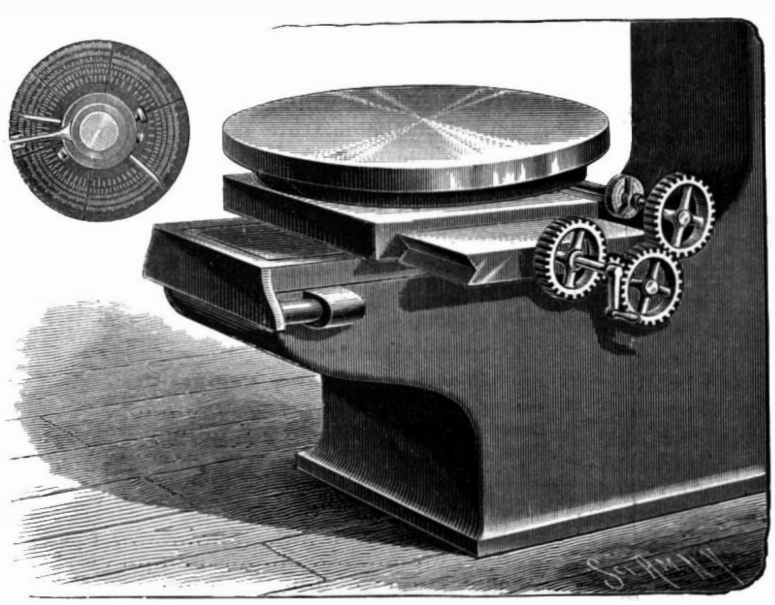
For further information relative to this invention address the inventor as above.



WILSON'S VEHICLE WHEEL.

AN INDEX PLATE FOR GEAR-CUTTING MACHINES.

An indicator attachment designed to be readily applied to an ordinary gear-cutting machine, to show the number of equal subdivisions into which the periphery of a disk is to be divided in cutting a gear wheel of any desired number of teeth, is illustrated herewith, and has been patented in the United States and Canada by Mr. Michael Schirk, of Plattsmouth, Neb. The small figure represents the face of the indicator plate, the larger view showing the device applied to a slotting machine. The plate is in the form of a disk adapted for rigid connection with the stationary parts of the frame of the machine. Centrally through the disk passes the turning shaft, surrounding which, and attached to the disk by a screw thread, is a flanged hub, in which the shaft freely revolves, there being adjustably carried on this hub a swiveling base-ring to which are adjustably secured radial markers. A sleeve, rigidly attached to the turning shaft by a set screw, carries a radial arm having on its outer end an adjustable pointer blade extending to the plane of the indicator plate. On the face of this plate are marked circular series of graduations, the graduations of the same length not continuing around the entire periphery of the plate, which is divided into six aliquot parts, forming sectors of the circle, the aliquot parts of one sector showing spacings for one size of tooth or number of teeth to a wheel, while those of the next sector are adapted for another size of tooth or number of teeth to a wheel. In this way a large number of graduations can be placed upon a single indicator plate, which is adapted to a wide range of use. To facilitate the work and avoid mistakes, a scale is provided showing the space to be left between the two markers for each set of graduations on the plate. The device is inexpensive to manufacture, wears little with use, and can be easily applied to a variety of machines, so as to be a convenience in even a small shop.



SCHIRK'S INDEX PLATE FOR GEAR-CUTTING MACHINES.

AN IMPROVED VEHICLE WHEEL.

The illustration represents a wheel constructed entirely of metal, with provision for an interior fluid circulation, whereby the expanding or contracting of the tire will be prevented. It is a patented invention of Mr. William S. Wilson, of Tombstone, Arizona. Fig. 1 is a vertical section through the wheel, its hub and box, and Fig. 2 is a transverse section through the box, illustrating the attachment thereto of the spokes. The hub box consists of an inner tapering section with a ring at each end, there being between the rings a longitudinal slot and apertures. The tapering section fits into a casing section, upon which is fitted a spoke sleeve, with a series of studs to receive the spokes, which are tubular, and preferably round at their outer and flattened at their inner ends. The felly is made of a single piece of metal bent upon itself to be U-shaped in cross section, and the outer end of each spoke is dished to fit the cylindrical inner or bottom wall of the felly, the inner end being flattened to fit the studs of the spoke sleeve. The spokes are held in position at the top by tubular tie rods, and in one side of the felly, at any convenient point, is an opening, ordinarily closed by a screw cap, into which sufficient oil and water are introduced to essentially fill the space within the felly and the tubular tie rods of the spoke. In winter, alcohol is substituted for the oil and water, and the liquid is designed to act as a heat distributer, preventing the expansion of the tire section by heat generated by the friction of a brake or the locking of the wheel while going down long mountain grades, the improvement being especially adapted for very heavy wagons.

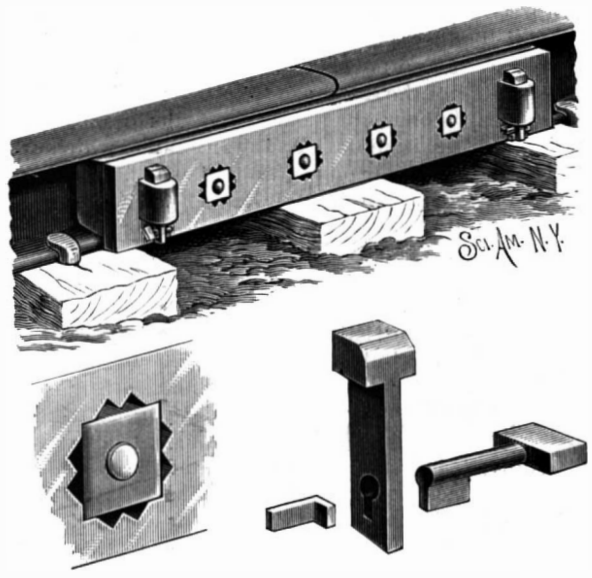
THE law compels no one to do impossibilities.

New Home of the Mechanical Engineers, New York.

The American Society of Mechanical Engineers has purchased for $60,000 the building hitherto owned by the New York Academy of Medicine, No. 12 West 31st Street. It is a fine four story building, 28 feet in width, with basement and cellar and an extension in the rear. A gallery around the hall is fitted with shelves for a library. As the building is larger than is needed at present by the Mechanical Engineers' Society for its own purposes, a portion of it has been leased to the American Institute of Electrical Engineers, and another portion to the Society of Amateur Photographers. It is the intention that the libraries of the Mechanical Engineers and of the Electrical Engineers will be placed together, so that each may be conveniently used by the members of both societies.

AN IMPROVED NUT LOCK.

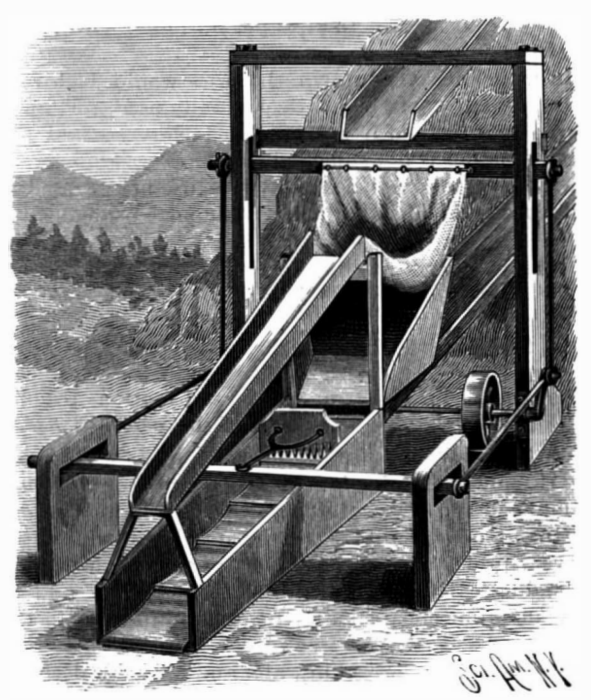
The invention illustrated herewith is designed to provide against all possible accidental displacement of the burrs or nuts employed in connection with a rail joint. It has been patented by Mr. Thomas C. Harris, of Rochester, Minn. The shanks of the bolts are passed through an inner fish-plate, and upon the outer side of the rails is a strip with outwardly extending tenons and apertures to receive the shanks of the bolts. To prevent the turning of the bolts on the outer ends of the nuts a locking plate is provided, in which the inner portions of the bolt apertures are circular, and their outer portions of star form, the ends of the locking plate being also apertured to receive the tenons of the strip which lies against the web of the rail. After the nuts have been turned approximately home, the locking plate is adjusted to position upon the tenons and the nuts further turned, and so that they will be brought into register with any set or series of recesses of the outer sections of the locking plate. To hold the locking plate in place, main keys are passed through apertures in the ends of the tenons, these keys being held from displacement by auxiliary keys, both shown in the small views, the latter keys being also held in place by a keeper.



HARRIS' NUT LOCK.

AN IMPROVED ORE CONCENTRATOR.

A machine for working pulverized ore-bearing rock, earth or sand, or tailings and similar material, is shown in the accompanying illustration, and has been patented by Mr. Edward Z. Kidd. The concentrating table consists of a series of sections of a pane of glass each, the upper surfaces being concaved, and the panes being



KIDD'S ORE CONCENTRATOR.

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fitted with a water-tight joint into a frame, the construction of the latter varying with different forms of the table. The tables in their normal position are inclined, the combined sections representing essentially an inclined plane, while each table may be provided with a shaft or spindle for tilting it at will. A waste flume is held upon uprights above the table, and at the upper end of the table is a frame in which a beam is held to slide vertically, the extremities of the beam being connected by links with the crank arms of a rock shaft journaled near the base of the frame. At each side of the table is a support for a beam held to slide horizontally, motion being communicated thereto from the rock shaft, and from the center of this beam extends an arm carrying an agitating comb reciprocating over one or more of the upper sections of the table. These sections are made with a flat upper face, and above them is a fixed hopper, below which is a water chute, whereby a current of water may be turned upon the face of the concentrating table at any time. To the upper end of the waste flume is securely fastened one extremity of a flexible pan or hopper, the other extremity of which is detachably attached to the vertically reciprocating beam. This hopper may be made of rubber, heavy canvas, or rawhide, and above it is a chute for supplying to the hopper such a current of water as may be desired. The pulp, gravel, ground earth, etc., to be operated upon, having been placed in this upper hopper, under the stream of water, is rolled backward and forward with the alternate rise and fall of the hopper caused by the vertically sliding beam, the slums, light gravel, etc., passing off through the waste flume at every upward motion, the concentrates settling in the center of the pan. When the charge has been sufficiently washed, the upper end of the hopper is released from its attachment and the contents dumped into the fixed hopper below, where they are further cleaned and concentrated in passing over the glass sections in the presence of water, the material being also agitated at the upper end of the table by the comb.

For further information relative to this invention address Messrs. Romans & Kidd, Deadwood, South Dakota.

THE FIRE ALARM SYSTEM OF JERSEY CITY.

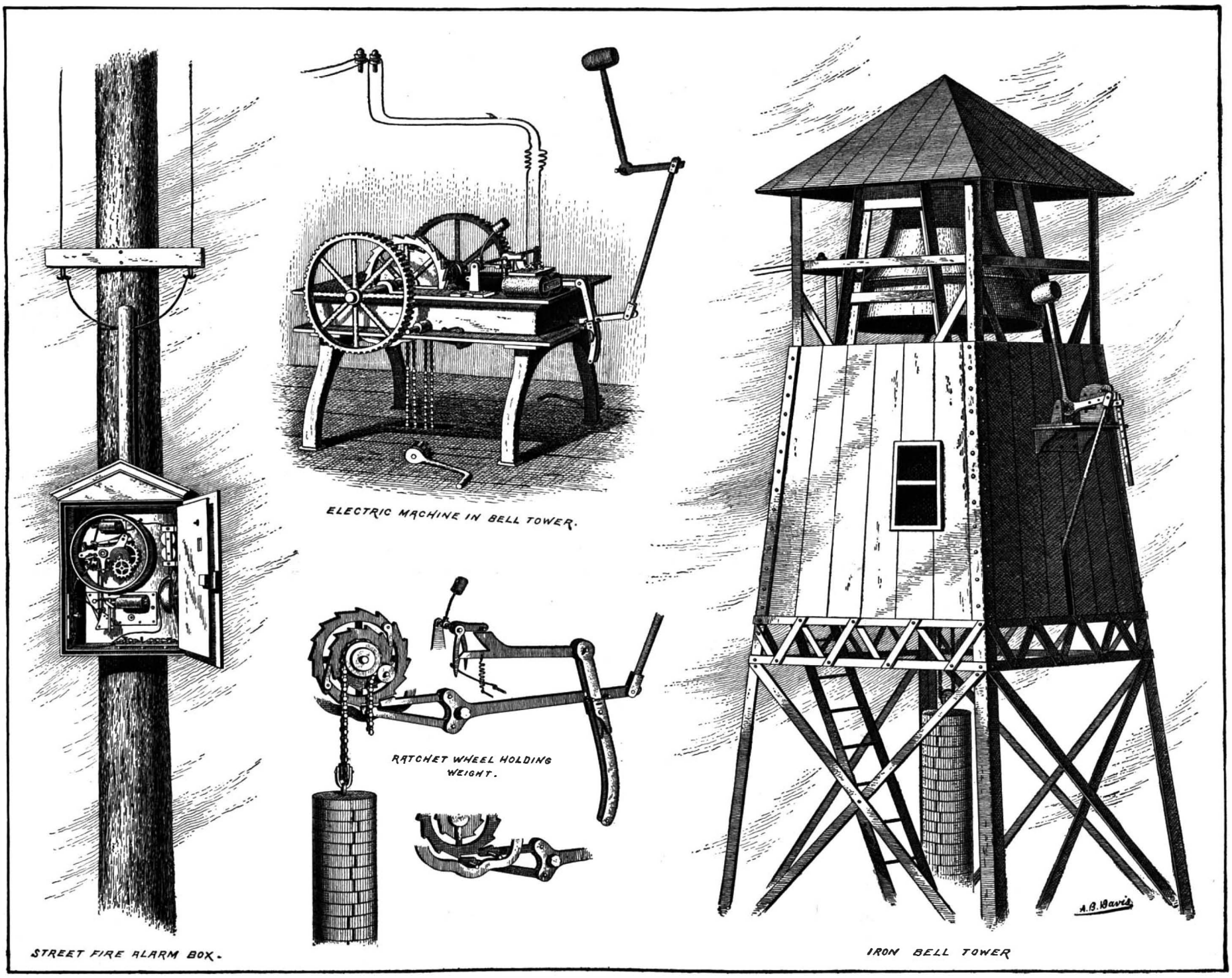
A feature has been introduced by the fire department of Jersey City into the fire alarm system of that city which distinguishes it from most of those with which we are familiar. It is a system that could be used with advantage, it would appear, in many of our towns where there is no paid force of firemen, but where the protection of property from fire depends upon volunteer fire service. The peculiarity of this system consists in ringing tower bells in different parts of the city by means of electric signals from alarm boxes located in conspicuous places in the public thoroughfares, similar in principle to those in use in this and other large cities. These alarm bells are rung automatically, in a manner that will be described later. The system is very ingenious and complete. There are four of these towers in Jersey City, from each of which every fire alarm is sounded, according to the number of the box whence it has been sent. These tower bells are rung in connection with the work of the fire department. In addition to the men on contract service in the engine houses, there are seven men on "call" attached to each engine and truck company. These men sleep at their homes, and answer the calls from the four tower bells, reporting for duty in obedience to their ringing. They receive a reduced salary of $75 per annum for their services.

The electric service also rings the gongs in all the engine houses of the city.

In the central electric station there are installed 340 cells, most of which are of the gravity type. These cells do all the work of the entire system. Twenty-five of the cells are devoted to ringing the bells in the tower. The others are divided up; some are for local work within the station; the majority are placed on nine circuits, including the engine house circuits and the alarm box circuits. These boxes are placed in various parts of the city upon the telegraph poles carrying the fire department wires.

The interior of a box is shown in the cut. The wires enter it and connect with a magnet whose armature is kept attracted as the circuit is kept normally closed. If a fire occurs, the box is opened and a handle is pulled down. This starts the mechanism. A metal drum is caused to rotate under a spring that presses on it. The circuit, including the magnet, is completed through this spring. A number of notches are cut in the periphery of the drum or disk. As it rotates, the spring drops down into these notches, and each time that it does so breaks the connection, thus opening the circuit. Each time that this occurs the bells in all the engine houses in the city ring, and the four bells in the towers ring the same alarm at a slower rate. The notches are cut differently for each box, so as to form by their combination and spacing a special signal.

When a box is rung, its "makes and breaks" are transmitted to the central electric station, where they actuate an automatic recorder and repeater. By one part or division of this apparatus the signal is recorded by holes punched in a strip of paper or "tape," and at the same time is repeated by relay action to all the engine houses. The same apparatus by its second division regulates the current to the four bell towers. Like the other circuits, the bell tower circuit is kept closed. If broken once, the bell rings once. The repeater therefore has to open the circuit once for each ring corresponding to the box number, and has also to space these properly to express the two digits that generally compose this number, such as two—four, three—six, etc. It has also to perform one additional function. The signals are sent out to the engine houses at the rate of a beat a second. This speed would not answer for the large bells, and the repeater sends out the signal at a slower rate for them. The tape is fed at speed regulated for one break per second, through that part of the apparatus which perforates it and sends out the signals to the engine houses. The engine house gongs are practically in synchronism with the alarm box actuating this part of the apparatus. Next the paper is fed through the part of the mechanism which operates the tower bells. The tape passes through this at one-half the former speed. A flat spring presses upon it and keeps the circuit closed as the paper holds it up in contact with a terminal. When a hole comes beneath it, its point drops into the hole and the circuit is broken for an instant and the bells ring once. This is repeated for each hole. Thus an autographic repetition at reduced speed of the en-



RINGING FIRE ALARM BY ELECTRICITY.

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gine house signals is given. It is much as if one should turn an inscribed phonograph cylinder at half speed.

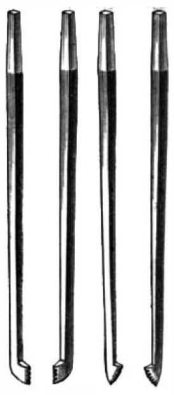
The bells are rung by mechanism actuated by a descending weight of 3,000 lb. When on closed circuit, the armature is held attracted by the magnet and the motion is arrested. When the circuit is opened, the armature falls back from the magnet. This releases the detent, and the ratchet wheel holding the weight begins to revolve. Referring to the cut, it will be seen that there are two pawls which engage with the teeth of this ratchet wheel. Each pawl is held to its position in engagement with the teeth of the wheel, or is released therefrom, by the action of a pin projecting at right angles from the pawl in question, and projecting through a slot of peculiar outline. This is shown in the cut directly below the drawing of the ratchet wheel and weight. This slot and pin mechanism is so arranged that only one of the pawls at a time engages with the teeth. When on closed circuit, which is the normal position, the upper pawl only is in engagement. When the detent is released, the upper pawl is first acted on by the revolving wheel. This action draws the hammer back from the bell. As the pin rides through the slot, the pawl escapes from the teeth and the other one engages and the hammer is driven against the bell. The bell-ringing lever rises and is again caught by the detent just as the pawls change places, and the motion is arrested with the upper pawl engaged until the next break in the current occurs.

The system includes 60 miles of No. 9 iron telegraph wire, 87 miles of insulated No. 12 copper wire, carried by 845 poles. It rings 18 engine house gongs, 6 small gongs for engineers, and the 4 tower bells. There are 94 alarm boxes. The gongs and boxes are placed on 9 circuits, and a tenth circuit comprises the bell-tower connections. Our thanks are due to courtesies received from Mr. John Spencer, superintendent of telegraphs for the department.

The distinctive peculiarity of the system shown is the ringing of tower bells from an electric system. It gives an excellent suggestion to towns having volunteer fire engine companies. In such towns a central tower with a good number of electric alarm boxes and connections would do most excellent service in accurately designating and ringing out an alarm of fire to arouse the members and tell them where their services were wanted.

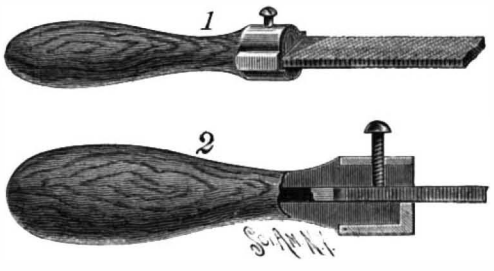
AN IMPROVED DENTAL INSTRUMENT.

The illustration represents an improvement in that class of dental instruments known as dental elevators or stump extractors. The instrument is made in "rights" and "lefts," so that the convex bearing surface may always be next the gum of the patient, to avoid bruising or lacerating the flesh, or next the jaw bone or an adjoining tooth. The instruments are all made with long shanks, to be easily operated in the mouth of a patient, and are adapted to be slipped into a handle when they are to be used. This invention has been patented by Mr. Daniel Siddall, of The Dalles, Oregon.



AN IMPROVED TOOL HOLDER.

The illustration represents, in section and perspective, a tool holder adapted especially to receive the burnishing irons of shoemakers, and also files with or without tangs or shanks, and files having their tangs or shanks broken off. It has been patented by Messrs. William MacMurtrie and Edwin H. Homsher, of No. 1832 East Somerset Street, Philadelphia, Pa. A shoulder and slot are produced in the forward end of the handle, the wood extending farther at one side of the slot than the other, as shown in Fig. 2. The ferrule has side projections, adapted to be located opposite the sides of the central slot, and a set screw extends through one side of the ferrule, whereby a file with a broken tang may be rigidly held in the handle.



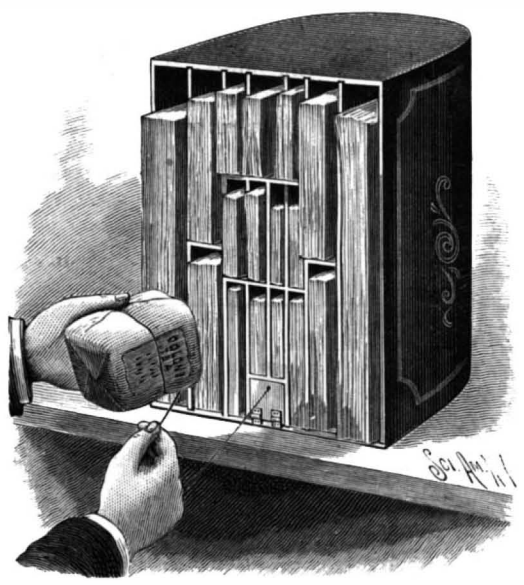
MacMURTRIE & HOMSHER'S TOOL HOLDER.

Photographic Halos.

The authors succeed in avoiding these halos by covering the back of the plate with a layer of normal collodion holding in solution a small quantity of chrysoidine. This varnish having an index of refraction little different from that of glass, completely suppresses the halos.—*Paul Henry and Prosper Henry.*

AN IMPROVED HOLDER FOR PAPER BAGS.

A light and simple construction, occupying but small counter or shelf space, for holding paper bags and sheets of paper for wrapping packages, and the cord or twine used therewith, is shown in the illustration, and has been patented by Mr. William B. Shafer, of Somerset, Pa. The casing is semicircular, and it is internally divided by vertical partitions of the same form, these curved compartments being divided by any desired number of horizontal partitions. The outer compartment is preferably left open for the reception of large sizes of paper, and centrally in front, at the bottom of the case, is a small twine-holding compartment. This holder may be made of paper or mill-board, to be very light and quite inexpensive.



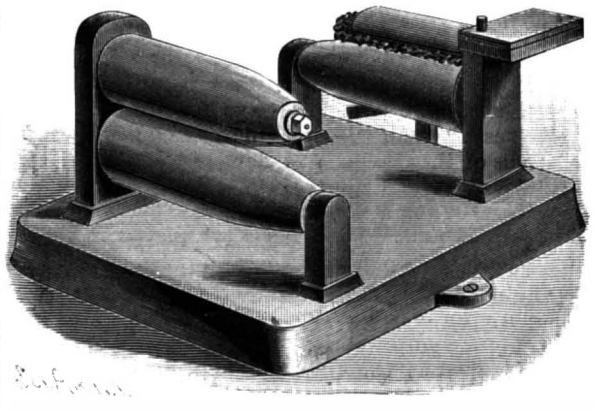
SHAFER'S HOLDER FOR PAPER BAGS.

Visit of the Iron and Steel Institute to the United States.

Next fall the Iron and Steel Institute of Great Britain proposes to visit America. This representative body will probably send over 400 of its members. They will be joined by more than 100 members of the corresponding German society, the Verein Deutscher Eisenhuttenleute. They will on arrival be taken in charge by the American engineers, and everything that can be done to make their visit a pleasant and memorable one may be anticipated. It is proposed to take the visitors all over the United States and let them see for themselves the giant strides which America is taking in the iron industry. When the visit occurs, much interest will be felt in the reception and proceedings. At present nothing beyond the announcement of the trip is in order.

AN ENVELOPE MOISTENER AND SEALER.

The accompanying illustration represents a device for moistening envelopes, pressing the flap down, and sealing the envelope. It has been patented by Mr. James Maret, of Mount Vernon, Ky. In standards, upon a suitable base, is journaled a tapering roller, and on one of the standards is held a water reservoir, with which is connected a holder supporting a thin, flat sponge, held close to the roller. The reservoir has an aperture in the corner adjoining the sponge holder, the amount of water passing to the sponge being governed by a plug or screw. At one side of the base is a standard, which supports a guide under the sponge holder. In other standards on the same base is journaled a tapering roller, the bearings of which are supported by spiral springs, an upper roller being journaled on a rod extending from one of the standards in such a way that these rollers are held in yielding contact with each other. The gummed surface on the envelope flap is first moistened by passing it between the guide and the sponge holder, drawing it forward over the roller beneath, when the flap is turned down and the envelope passed between the spring-pressed rollers, thus effectually sealing it. A corner of the envelope may also be conveniently moistened to receive the stamp by means of this device.



MARET'S ENVELOPE MOISTENER AND SEALER.

Increase the Patent Office Facilities.

Three millions of dollars is the sum which it is proposed to appropriate for the building of a new Patent Office, or for making some provision for removing the other bureaus of the Interior Department from their present quarters and giving the whole of the building to the Patent Office.

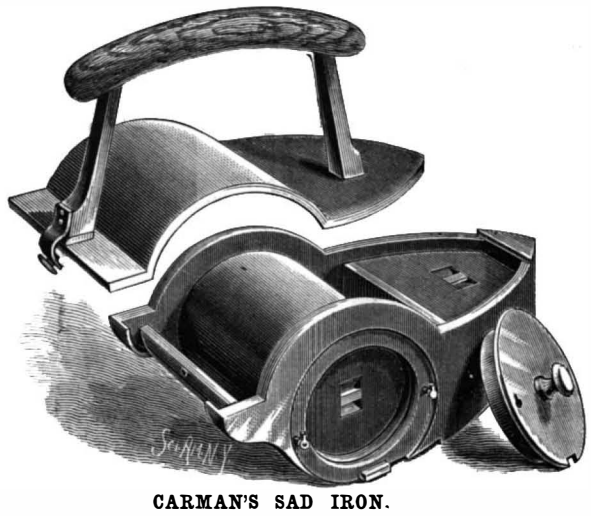
Representative Butterworth, chairman of the committee on patents and ex-commissioner, states, in a report to the House, that a suitable building can be constructed by private contractors in one year, but that it would probably take the government from five to ten years to do it, and it would cost twice as much. He declares, with much emphasis, that there is neither justification nor excuse for continuing the office in the insufficient, inconvenient, and unhealthy quarters which it has so long occupied, and which are rapidly becoming more unfit for the purpose. He believes that Congress has dealt with this important bureau in palpable disregard of the rights of the citizens having business to transact before it, and who pay the whole expense of its maintenance.

The *Electric Review* repeats what has so often been said before about the necessity for additional room for the Patent Office, but which Congress seems reluctant to understand, or rather has heretofore been indifferent about remedying.

The editor says: "Inventors not only pay the cost of their own labor and researches in perfecting their inventions, but they also pay the cost of the examination by the government to determine whether the invention is new and useful, and therefore patentable, and, if patentable, they pay the expense of issuing the patent. So that the Patent Office has to its credit $3,631,670.32 over and above all expenses, which the inventors of the country have paid for the support of the bureau, and this surplus should be used in providing proper facilities for the rapidly increasing work."

AN IMPROVED SAD IRON.

This sad iron, patented by Mr. Albert Carman, has a hollow body divided by a transverse partition forming a front chamber, closed at the bottom, constituting a hollow pressing block, designed to contain a loose heating solid metal core, which may be readily placed in or removed therefrom. In the rear of the front chamber is a space adapted to receive a hollow pressing roller, containing a removable heating metal core, readily placed opposite side lids covering the space occupied by this roller. The top of the body of the iron has a removable cover, on which are stanchions that carry the handle, the cover being fitted to its place by entering it within upper raised portions of the side walls and sliding it forward under a cap on the body of the iron, the rear end of the cover being fastened in place by a spring catch. For further information relative to this invention, address Messrs. Carman & Martin, No. 416 Main Street, Winnipeg, Manitoba, Canada.



CARMAN'S SAD IRON.

Japanese Anemones.

For entrance steps, porch or piazza decoration few plants excel well grown specimens of *Anemone Japonica*. A correspondent from Wellesley, Mass., in *Garden and Forest*, says: Ours are grown in twelve inch pots, started in a frame during March, which advances them sufficiently in this latitude to bloom toward the end of September. Further south this would be unnecessary. We place five to six strong crowns in each pot, in good loam. As soon as the flower stems appear in August, liquid manure is given. Abundance of water is essential throughout the season; just sufficient staking is done to get good specimens. The best varieties are the white Honorine Joubert and the hybrid pink.

Bridge Moved by an Earthquake.

A peculiar accident recently occurred on the Southern Pacific road. An earthquake moved the iron truss railroad bridge over the Pajaro River, on the coast division, about one foot and prevented the passage of trains. The bridge, however, remained on its stone piers and was safe after the rails were moved in line.

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Correspondence.

The Population of Pittsburg, Pa.

To the Editor of the Scientific American:

I notice in your issue of May 17, a communication from John T. Findley, of this city, in which he speaks of Pittsburg having a population of 450,000. Without doubt he has overestimated it. The 1880 census credited us with 156,000 inhabitants, and the average growth per decade of the whole United States is about 32 per cent, which would give us (approximately) a population of 206,000. However, we expect the coming census to show 225,000, on account of cheap fuel and other advantages. Mr. Findley extracts conclusive proof from our standing in the clearing house of our population. This is not a good basis on which to figure, as our clearings take in much contributory territory. Moreover, if that were a reliable index to our growth, we would be compelled to give New York City credit for comprising half the population of the United States. And even Mr. Findley would hardly like to go on record as giving that immense city a population of 30,000,000 or 35,000,000. CONSERVATIVE.

Pittsburg, May 15, 1890.

Preservative and Non-poisonous Paints.

To the Editor of the Scientific American:

We have noticed two or three communications in your paper from Louis Matern, Bloomington, Ill., concerning "what paint will best protect tin on roofs." He answers his question at once by saying that the best paint known to him is red lead ground in raw, cold-pressed linseed oil. As an example of its tenacity and weather-resisting power, he says: "I treated the roofs of my factory, eighteen years ago, with two coats of red lead on both sides of the tin, having since repeated the painting of the upper side every three or four years (through persuasion) with iron ore paint. The result is, there is little flaking of the red lead, but no end of trouble from the iron ore paint."

This example of lasting power is very like the old lady's broom that lasted forty years by hanging behind the door, while other brooms were worn out with the sweeping.

Your correspondent closes his rather remarkable letter with the still more remarkable statement that "All paints not poisonous, and requiring driers to insure hardening, are unfit for durable painting." It must seem strange to your readers to be told that if they wish a durable roof paint, they must have a poisonous paint. Now, as a matter of absolute fact, this is not true, as very many of your readers know, and little credit could be given to modern science if such a condition existed.

Nature has furnished in graphite a material that would seem to fulfill all the requirements for an ideal roof paint. It stands equally well the extremes of heat and cold. It is very light, one pound of graphite being three times the bulk of white lead and twice the bulk of mineral paints; hence, in use it will cover twice the surface, at least. Each particle of graphite is in the form of a flake, and in painting these flakes lap one on the other, making a flexible coating that will stand any amount of bending. Graphite is one of the forms of carbon. It is as pure and healthful as charcoal itself, and, as it is unaffected by contact with any known substance, it suffers no chemical change, but remains always the same. It is equally useful for shingle roofs, as it prevents the shingles from imparting their woody taste to the water.

If Mr. Matern had painted his factory roofs with graphite paint, he would probably have found, as others have found, that his roofs would not have needed repainting for ten or fifteen years, and he would have had a non-poisonous paint from which water would run sweet and pure. GEO. E. LONG.

Jersey City, N. J., May 20, 1890.

Successful Profit Sharing.

Profit sharing as a solution of the labor problem is not making the progress that its advocates hoped for a few years ago, yet in some industries where it has been judiciously applied and adhered to persistently it has proved a decided success. A large manufacturing concern near Cincinnati, which employs many operatives and has an industrial village of its own, adopted profit sharing some time since, and has just declared a semi-annual dividend amounting to 15½ per cent on the wages of the operatives, or 30 per cent per annum. That makes a very handsome addition to a workingman's income. For instance, if he earns $700 per year, his dividend amounts to $210, which he can very readily lay aside for a rainy day. It is needless to say that there are no labor troubles in that concern. The men have no disposition to strike and the interests of the concern are theirs to an unusual degree. They know that vigilance and industry will repay them in proportion as they benefit the concern, and the employers find that the increased activity and industry of the men fully compensate them for the large dividend of the profits paid to them.—*Springfield, Mass., Union.*

Wood, the Naturalist.*

If any one were asked to name the two most popular writers on natural history of recent times, the answer could only be Frank Buckland and J. G. Wood, and of the two the latter was perhaps the greater favorite. Every one has had his books in his hands on many a country ramble or seaside scramble in rock pools in search of "specimens" for the aquarium; and no other writer has done so much as the author of "Homes without Hands" to make natural history familiar to the unscientific mind and interesting to the general. His life, by his son, will undoubtedly be read with genuine appreciation by the thousands who have learned to observe "common objects" under his guidance. It is too long, and dwells too much on trivial details, but it is full of interest and of good stories, and makes the author, whom we all know by his books, a distinct personality, abounding in life and character.

Wood was, indeed, essentially what is termed a "character"—quite as much as Buckland. There was nothing, certainly, in his beginnings to foretell his future bent. Born in London in 1827, the son of a surgeon, he had only the advantage of delicate health to prepare him for intellectual achievements. Necessarily kept much at home, he soon developed a passion for reading; taken to Oxford for the sake of country air, he rapidly established intimate relations with the Cherwell, in or on the banks of which sacred stream he continually disported himself, till he knew all its inhabitants, their ways, homes, and tastes, by heart. The habit of observation thus early developed grew upon him. His rooms, when a scholar of Merton (where he entirely supported himself), were a menagerie of strange creatures. Grass snakes crawled about, to the terror of the bed-maker; five hundred "woolly bears" (we mean the caterpillar, not the Russian sort) colonized an ingeniously contrived asylum, whence they were removed, a few at a time, every day or two, bottled, and then dissected, in the course of a minute study of the growth of the tiger moth. Cages, boxes, nets, were scattered over the floor or hung upon the walls. Probably the specimens occasionally suffered from the fumes of rank tobacco exhaled, not by Wood, but by the Ghost of Nobody's Poker—on which remarkable phenomenon the book must be consulted. The natural taste for animal and insect life was confirmed and systematized by two years' study under Acland, at the Anatomical Museum, while waiting for the due time of ordination; and when (1852) appointed curate of St. Thomas Martyr, at Oxford, the old explorations of river banks and Bagley Wood still continued.

It must have been a sore trial to have to leave the country and take up his residence near St. Bartholomew's Hospital, of which he became chaplain in 1856; and six years later the craving for fresh air became so imperative that he and his wife moved to Belvedere, where his favorite studies could be pursued, notwithstanding vigorous assistance to neighboring parsons on Sundays, and in spite of being burned in effigy and cited before the Archbishop as a "ritualist" for, *inter alia*, collecting the offertory *in colored bags!*

Wood, despite his early delicacy, was a man of tremendous vigor. He was a great swimmer, skater, and gymnast (we all know him as Mr. Bouncer in "Verdant Green"), could fence and box well, made night horrible with the strident tones of his euphonium, ran three miles on end every day before breakfast till he was forty-five, and worked like a steam engine. He would begin work at five in the morning, and end at eleven at night, with but two hours' sleep in the afternoon. By such indefatigable energy he contrived to produce thirty or forty distinct works, besides compiling abridgments, and writing articles in magazines, of which he edited several, and giving, from 1879 to 1888, innumerable lectures in England and America. His great hit was made in 1857, when the ever popular "Common Objects of the Seashore" was published by Messrs. Routledge; to be followed in 1858 by the "Common Objects of the Country." So great was the run on the latter that 100,000 were sold in the first week, and printer and binder could not keep up with the demand. It is painful to learn that the author only received £30 apiece for these still favorite manuals, and still worse that the publishers did not recognize their moral duty to go beyond their bond. But Wood was essentially a careless man in such matters, though in some others he was curiously "natty" and methodical. In vain he "hasted to rise up early and so late took rest;" he cannot be said to have "eaten the bread of carefulness;" and though he was "beloved" by hundreds of thousands of readers and hearers, he was not "given sleep," but wrestled with the demon of insomnia.

He was careless in other things besides publishers' agreements and money matters. He would leave his clothes and books (and, worse still, other people's books) wherever he stayed; he continually missed his train, and for smashing his bones he had no rival. At different times he broke his right arm, right leg, collar bone (twice), six ribs, and nose, dislocated his ankle and many of his fingers; and, after all, he was not a penny the worse, except when he tumbled over a mud heap (he was always tumbling over something, gravestones, for example, owing to his short sight) broke most of the bones of his right hand, and, nevertheless, went on just as he was—performed the service at a neighboring church, administered the sacrament, preached a sermon, and then came home to have his fingers set! His hand never quite recovered from this severe experience, and he had to take to a typewriter—on which, by the way, he was working in a train, while suffering from acute peritonitis, two days before his death, in February, 1889. His was a singularly brave, persistent, unique character, impossible not to like and admire, and his son has done good service in portraying it so clearly and well.—*St. James's Budget.*

* "The Rev. J. G. Wood: His Life and Work," by the Rev. Theodore Wood. With portrait. (London: Cassell & Co. 1890.)

Growing Aquatic Plants at Home.

Lotuses, like water lilies and other aquatic plants, says a writer in that excellent floral and horticultural journal, *Popular Gardening*, can be grown in wash tubs sunk into the ground. It will be necessary, however, to have the tub strong and well hooped, so that it will not be liable to give out, the culture being the same as water lilies. We quote the following hints, concerning ponds and tubs, from O. J. Farmer:

Many persons are not aware of the ease with which water lilies can be made to grow and bloom in all their beauty and fragrance in the yard, with the trifling cost of constructing a small pond or sinking in the ground an old tub or barrel sawn in half, and kept filled with water during the summer, covering up with straw and boards in the winter to keep from freezing. The ponds should be made about two feet deep; for lilies bloom better in shallow than in deep water. Get some healthy, knotty roots, cover but slightly with rich mud, fill with water, and the job is ended. For tubs, take any strong barrel free from tar, oil, or salt; old molasses or whisky barrels are about the best, for the nature of their contents presupposes them strong and well hooped. If an old wagon tire be driven snugly on the bottom, and the tub well painted, they will last a dozen years or more. Now saw the barrel in two at the bung, fill each half full of fine loam, or if the barrel be a large one, only fill about a third full, lay in the roots, straighten out the small fibers, and cover to the depth of about two inches, and if it is intended to put fish in, overlay with coarse gravel to prevent the fish from burrowing down and exposing the fibrous roots, until all are well set. Now sink the tub to a level with the ground, and fill very gently with rain or river water; well water is not natural to aquatic plants. I venture that ninety per cent of the failures to grow plants in this way are the result of using well water. Replenish the tubs with water from time to time, to supply evaporation; this is all the care they need. If desirable, these tubs may be set on a platform on rollers, instead of sunk in the ground, and can thus be kept indoors during the winter. Kept filled with water, they will come out early in the spring.—*G. R.*

Men and their Hobbies.

A statement made by a wise man is that "Every honest man has a hobby." The man in question did not use these precise words, says the *American Cultivator*, but they amount to the same in substance.

A man who is always tinkering around, making something or other in the mechanical line, is never found spending his leisure hours in a gin mill or saloon. The young man whose hobby is study will be found at his books as soon as his day's work is done and supper is swallowed.

The chap who has "music on the brain" will be puffing or scraping his instrument early and late, until his friends almost wish he would quit his hobby and relegate himself to the rum shop.

Many young men ride a mechanical hobby, and are often building experimental machines, and making "young" steam engines. To such men, electricity possesses a most enticing field. There is no end to the directions in which thought may be profitably turned in connection with electricity. Well developed as it is, electricity is as yet an almost unknown thing, which will require lifetimes of study to reduce to the full understanding of all. Electricity is the future power of the world, as it has always been its life, although unknown and uncomprehended for ages.

That a young man will waste hours and days of his life in doing worse than nothing, when he has such a field before him, is scarcely to be comprehended, but it is a disgraceful fact. Let the young men awake to the idea that the advance of the world depends upon them personally; that the years to come may be better or worse as they choose to study or to be idle, and it seems as though they would quit beer drinking, dice shaking, and card shuffling instantly, to avail themselves of the privileges before them.

A man may be about what he makes himself nowadays, and if he chooses to become a sot, the way is open; if he chooses to become a power in the land, he can do so by going to work in that direction and keeping at it.

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Success in Heliography.

A dispatch from Prescott, Arizona, mentions a great achievement in heliographing recently accomplished during practice in the Department of Arizona, by Lieut. Wittenmeyer, who succeeded in signaling a message by a single flash 125 miles from Mount Reno, near Fort McDowell, to Mount Graham, near Fort Grant, where it was received by Capt. Murray. The latter by turning his instrument flashed the message to Fort Huachuaca, a distance of 90 miles, making a distance of 215 miles with a single intervening station. The longest distance heretofore made with a single flash is said to be 70 miles.

A heliograph may be described as a simple instrument that is used for signaling by sunlight from a plane mirror. The signals are made by flashing reflections or by obscuring and revealing at will, by a movable screen, an otherwise constant light, which is technically called a "standing flash." The instrument working with a screen has been usually called by the inventor a "heliostat." That giving flashes has been called a heliograph or a heliotrope.

The word heliograph, however, is commonly used to denote both, and will no doubt continue to be the accepted name. A complete instrument consists essentially of two plane mirrors and a "sighting" rod, and, when a "standing flash" is used, a screen. The mirrors are firmly supported, usually on a tripod, and are fitted with vertical and horizontal tangent screws. By means of the tangent screws the mirrors can be turned on their supports so as to face in any desired direction toward the sky. When a movable flash is used, one of the mirrors is so mounted that a motion of three or four degrees about its horizontal axis can be given it independently of the tangent screw, so that the flash can be thrown on and off the receiving station at will, and quickly.

The screen, when used, is on a separate support, in order, when working, to avoid any shaking of the mirrors. Both mirrors are used when the signalman facing the receiving station has the sun in his rear. When the sun is in his front, or nearly at his right or left, only one mirror is used. The sighting rod, as its name implies, is an auxiliary used with the tangent screws, to put and keep the mirrors in such a position that the flash can be cast with certainty on the receiving station.

Unless the flashes are produced rather slowly, and the dots and dashes separated very clearly, there is great liability of confusion. Even very expert readers of these signals are liable to make mistakes, and to clearly communicate ideas the operator must observe constant care and "space" his dots and dashes with extreme nicety. The heliograph may be manipulated after night by means of a clever arrangement of two small lamps attached to the instrument. Flashes, long or short, can be produced by delicate adjustment.

Among the heliographic instruments heretofore described in the SCIENTIFIC AMERICAN is one by which, when a key is pressed, like a telegraph key, the flash of light is made of long or short duration, answering to the telegraphic dot or dash. Another improvement is that in which the flashing mirror is attached to an opera glass.

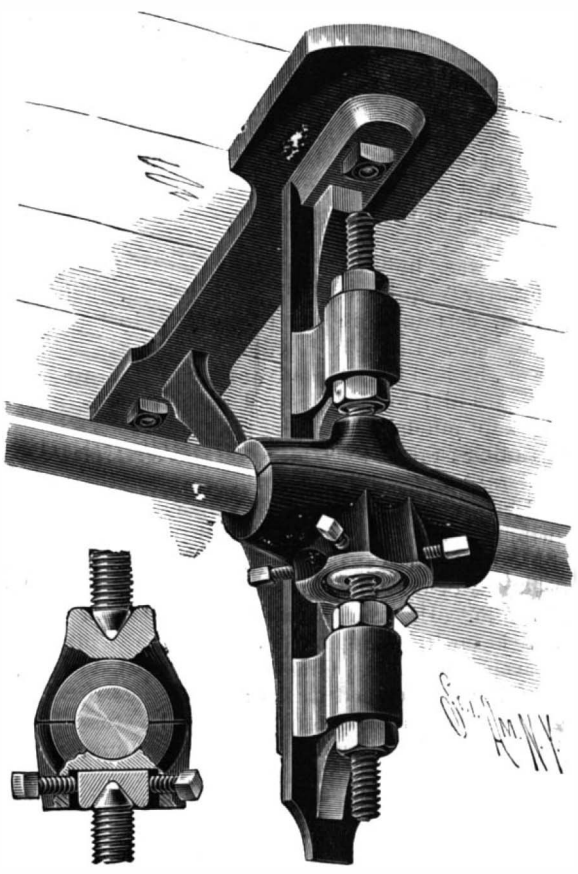
AN IMPROVED LOGGING RAILWAY.

The illustration represents a simple form of logging railway designed to be expeditiously and conveniently built in any lumber region from the materials at hand. It has been patented by Mr. Frank V. Holston, of Bayfield, Wis. The supports or standards are formed of logs placed in the shape of the letter A, and between their upper contacting ends is secured a depending perpendicular log of about half the length of the standards, there being attached to this latter log and to one of the side standards a cross bar of hewed timber. The standards may also be connected by side and bottom brace rods when deemed necessary. The tracks are laid upon stringers resting upon the inner ends of the cross bars, and upon the tracks travels a carriage consisting of two or more hangers, connected by rods or bars, the hangers being bent upon themselves at their upper ends, where a grooved wheel is pivoted to travel upon the track. The lower ends of the hangers are carried beneath the track and connected by a log, and each hanger has a chain with a grab hook of any approved construction, whereby the logs to be transported may be held from the carriage at an elevation from the ground. To the upper curved extremity of one hanger is attached a cable designed to return the empty carriage, while a second cable, operated by power from any convenient source, is carried beneath the track and over a grooved roller on an arm attached to one of the hangers, in such position as to be readily gripped by a cam lever, when the logs have been securely attached to the carriage.

HOLSTON'S LOGGING RAILWAY.

AN IMPROVED SHAFT BEARING.

The illustration represents a universal shaft bearing adapted to adjust itself automatically to the position of the shaft, which has been patented by Mr. H. Schneider. The bearing support has vertical screw-threaded bosses in line with each other, threaded bolts with conical ends working in the bosses, the bolts being adiusted to position by set nuts. The bearing consists of an upper and lower section, which, when placed together, have the proper aperture to receive the shaft, and the upper section has a recess for the insertion of the conical point of one of the threaded bolts, while the other section has a recess within which is a bearing plate fitting the conical end of the other bolt, the recess for this plate being large enough to permit the plate to be shifted by means of radial binding screws working through threaded horizontal apertures in the raised rim or edge of the recess, and bearing with their inner ends against the sides of the bearing plate, as shown in the sectional view. The illustration represents the bearing as applied in connection with a hanger, but it may as readily be used in connection with a standard fixed upon the floor, or with wall brackets, the movable bearing plate being placed either above or below the shaft, as may be most convenient, the improvement giving the journal box or bearing sufficient play to enable it to yield or adjust itself automatically to any slight play or vibration of the shaft, thereby avoiding undue strain and the friction and wear incident thereto. The movable bearing plate also permits of lateral adjustment of the shaft bearing, even when the shaft is running, while vertical adjustment may be quickly effected by the adjustable upper and lower bolts or pivotal bearings and their respective binding nuts. For further information relative to this invention address Mr. H. Schneider, Dey Street House, No. 58 Dey Street, New York City.



SCHNEIDER'S SHAFT BEARING OR HANGER.

THE best quality precipitated chalk perfumed with orris root makes a good tooth powder or paste.

Purchasing Beets.

The several beet factories which have had a short existence in the United States experienced difficulties with farmers when purchasing beets. The uniform price per ton, regardless of quality, is evidently the most simple method of overcoming the difficulty. The farmer's main object in view would then be to raise large beets, giving a heavy yield per acre, but averaging a low percentage of sugar. One campaign of a factory working under these conditions would end in ruin. If it were possible to contract for roots at say a uniform price of $4 per ton, with ironclad rules respecting seed used, methods of planting, fertilizer, etc., the existing difficulties offered in California by the sliding scale of prices could be overcome.

On the other hand, experience in America has shown that farmers, while contracting to follow certain lines of cultivation, drift into their own methods without being aware thereof; hence there is a necessity of having a sugar beet overseer, his sole duty being the daily visiting of every portion of land where beets are being raised, and thus make certain that barnyard manure is not used the year of planting, and insist that the cultivator be run several times between rows of beets, so as to eliminate weeds, etc. In other words, his duty would be to follow out all the best rules laid down for the production of roots rich in sugar. Beets to be received at the factory should be analyzed and their exact locality of growing made known. In special cases the fertilizer used could vary. The work of practically carrying out such a method is expensive, but it has for ultimate effect the bringing about of perfect harmony between all parties interested.

We receive letters from California sources wishing to ventilate their grievances in print. We cannot publish such letters, but realize perfectly how difficult it is for them to understand why beets raised upon same soil, with same seed, by same methods of cultivation, should vary in price several dollars a ton. We are convinced that perfect conscientiousness exists on the part of the chemist employed by the factory. Why not do as is frequently done in Europe, *i. e.*, the farmers to have their own chemist, the expense, when divided among many cultivators, being but small, and then insist that the sample of beet selected at factory should be cut into two equal parts—the analysis obtained on the one hand should agree with that on the other. If a variance existed an average could be taken, and the price per ton thus determined would be more satisfactory than at present.—*Sugar Beet.*

Migrating Birds.

A dispatch from Cedar Rapids, Iowa, says: "A migrating bird wave which was passing over here on the night of May 17 encountered a severe rain and thunder storm. Attracted by the electric lights, the birds gathered about them and attempted to fly into the stores. As a consequence, more than 1,000 birds fell dead in the streets from coming in contact with the wires and the glass fronts. Few of these birds inhabit this region, and some rare specimens were captured alive and caged. Among them was a red-poll warbler, one of the rarest birds in the United States. This bird nests in Manitoba and Alaska in summer, and in the winter goes as far south as the Caribbean Sea. More than fifty different species of birds were found.

A Mysterious Olive Disease.

A strange disease has broken out in some of the olive orchards in the Pomona valley, and in many respects recalls to mind the mysterious vine disease. It was first noticed about two and a half years ago, and has been making headway ever since. So far no one has yet discovered its cause, whether it is bacteria in the sap or a disease of the wood. Its attack is indeed singular. The tips of the branches and smaller limbs begin to dry up and the wood turns a light brown, often taking in a whole limb. Many branches will show an apparently healthy twig on one side while on the other side a dead and withered growth tells the story of its presence. One tree may be apparently healthy with the exception of a single branch or shoot, while other trees are nearly from one-quarter to one-half dead. The affected portions convey the idea of having been scorched by a severe fire. The malady is reported quite universal throughout the valley, and is causing no little anxiety among the olive men. Specimens have been sent to Secretary Lelong, of the State Board, but so far no reliable information touching its cause and cure has been learned from any source. Prof. Coquillett has sent specimens of the leaves and wood to the department at Washington, and it is to be hoped that the mystery will be cleared up and a remedy found before its spread becomes serious. A "mysterious vine disease" is quite enough for Southern California, without the addition of a "mysterious olive disease."—*Rural Californian.*

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THE INDUSTRIAL SOUTH—TALLAPOOSA, GA.

(*Continued from first page.*)

to 50 tons of charcoal iron daily, employs at present about 75 men and receives the iron ore from Cedartown, Ga., Dansville, Ala., and intermediate points. Between 4,000 and 5,000 bushels of charcoal are used daily, and under the efficient management of J. A. Burns, pig iron is being shipped to Pittsburg, Pa., and after paying freight of $5 a ton, leaves a profit of $7 a ton, or over 50 per cent on the cost of manufacturing.

"The Mountain City Glass Works have been running less than three months, employ 100 hands, and are now turning out from 900 to 1,000 dozen flasks and bottles a day. Bottles are made in all sizes, holding from one-half ounce to one gallon. As might be imagined, flasks constitute an important part of the product. These are made in three sizes, half pint, pint, and quart, for the Southern trade. The sand used in the manufacture comes from Irondale, Ala., and the coal from Tennessee. As showing the way in which the Southern people encourage home industries, it might be mentioned that one Southern manufacturing company has given these works an order that will take the entire output for the next two years.

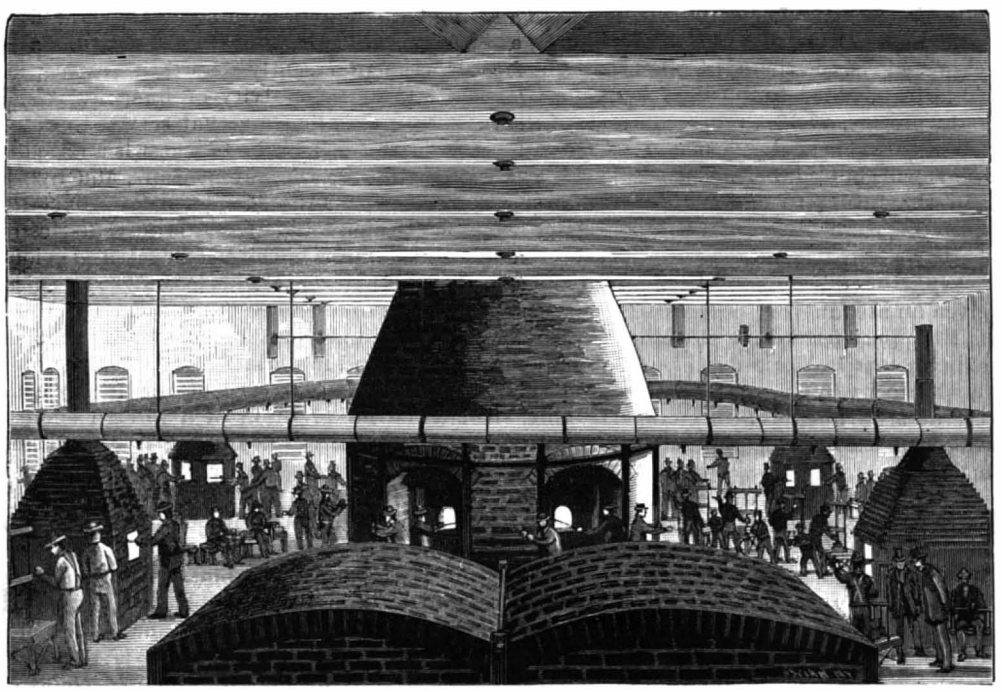

Fig. 5.—MOUNTAIN CITY GLASS WORKS—MAKING FLASKS AND BOTTLES.

"The Tallapoosa Knitting and Manufacturing Co. make seamless hose of medium grade for the Southern trade. Employ at present eighty hands, have capacity for 200. New hands are being added as fast as they can be taught. The output is now 200 dozen a day, with a full capacity of 600 dozen. The yarn used is procured from Macon, Ga., and whenever possible, the products of Southern mills are used. Finer grades of goods will soon be made.

"Contracts are about closed for the location of car works, bit and auger works, merino mills and several smaller industries. By the end of this year fully seven hundred additional hands will have to be employed at the various factories, and all of the skilled labor must come from the North and West.

"Wood and lumber are plentiful and cheap, hard cord wood being delivered for $1.50 per cord, and dressed hard pine timber that costs $18 per thousand in the North can be furnished here at $6 per thousand."

"We show in one of our illustrations one of the old style cottages that are found throughout the South, and also one of the new style that have been built by Northern people for homes for those that work in the iron furnace and glass works. This new house, which is only one of a large number already erected and inhabited, contains five rooms, besides pantry. It is well built, lathed and plastered, and, including outbuilding and well, was finished complete for $375. As such houses can be rented as fast as they can be erected, at ten dollars a month, it will be seen that an unusual chance for remunerative investment in building is afforded."

"The Blue Ridge Mountains extend from Virginia to Alabama and contain some of the most valuable mineral springs in the world. At no point in the whole range are they more plentiful or more varied in their medicinal properties than at Tallapoosa. Thousands of springs of pure free-stone water are found dotting the hillsides in all directions.

The new spring house just completed, which we illustrate, covers a remarkable locality. Three springs bubble here, the water of each being different to the taste, and the water from the fourth fountain, that of the Chalybeate Spring, is forced here by a hydraulic ram from the spring, which is over a mile distant. These springs have a wide reputation. The pale and anemic patient may take freely from the waters of the Chalybeate Spring with the assurance that the red corpuscles of the blood will be fully restored, while those suffering from renal diseases may hope to be greatly benefited by drinking daily from the more palatable waters of the Lithia Springs. These mineral waters are tonic in effect, and may be taken with beneficial results as a beverage by those in comparatively good health.

We give below the analysis of the Tallapoosa Chalybeate Spring water, made by Prof. John M. Candless, analytical chemist, of Atlanta, Ga.:

	Grains per Imperial gal.
Bicarbonate of soda	0·251
Bicarbonate of potash	0·848
Bicarbonate of magnesia	0·563
Bicarbonate of lime	0·846
Bicarbonate of lime	1·968
Bicarbonate of manganese	0·898
Sodium chloride	0·482
Sodium phosphate	0·044
Alumina	0·021
Silica	0·495
Organic matter and combined water lithia, traces	2·115
	8·531

In Fig. 8 we give a bird's eye view of Tallapoosa, showing the river, streets, and location of manufactories. We do not attempt to show the houses, but this cut will give a good idea of the way the city is laid out. Land on both sides of the railroad is reserved for factory sites, and these sites are given to parties who desire to locate industries here, and will not be sold to others.

The Tallapoosa Land, Mining, and Manufacturing Co., Tallapoosa, Ga., of which Ralph L. Spencer is manager, will be glad to give any additional information. Those who are contemplating a change of location will do well to investigate the many advantages which the Mountain City affords."

Fig. 7.—LITHIA SPRING HOUSE.

Fig. 6.—OLD AND NEW STYLE HOUSES—CRACKER TEAM.

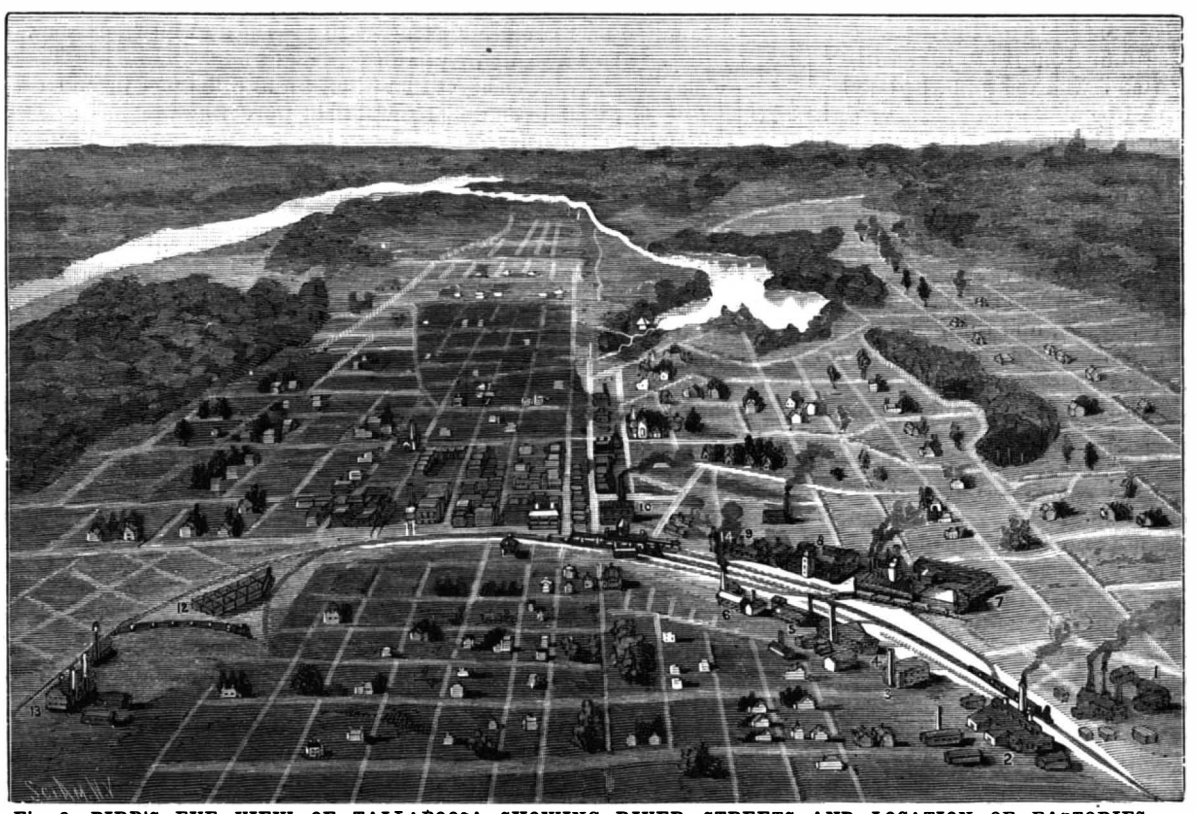

Fig. 8.—BIRD'S EYE VIEW OF TALLAPOOSA, SHOWING RIVER, STREETS, AND LOCATION OF FACTORIES.

1. Wagon factory. 2. Glass works. 3. Furniture factory. 4. Enterprise Cotton Co. 5. Poosa Mfg. Co. 6. Planing mill. 7. Tallapoosa Iron Works. 8. Chair factory. 9. Foundry and machine works. 10. Woodworking mill. 11. Jeans and overall factory. 12. Stock yards. 13. Soap works. 14. Hosiery mills.

Curious Railway Magnetism.

La Nature notes the following curious and interesting phenomena: Two railways, one the Sceaux line and the other the Ceinture, pass within a comparatively short distance of the Montsouris Observatory, Paris, the former line being about 80 meters distant and the latter but some 60 meters. During the passage of trains on the Ceinture line, which is nearest to the observatory, the bifilar magnet is found to be disturbed, and its oscillations are registered photographically; indeed, the movements are so regular that the curve clearly indicates the exact time of each train passing the observatory. This phenomenon is due to the fact that as the line crosses the direction of the magnetic meridian the wheel tires of the carriages become magnetized by induction, and so produce, in consequence of the laws of magnetism, a deviation of the bifilar magnet. The trains on the Sceaux line give rise to a phenomenon not less curious. Whenever the engine driver blows off steam, the electrometer is partly discharged, the electrical potential of the air falling to about one-half of its original value. These disturbances are brought forward by the director of the Paris Observatory in order to oppose the scheme which is now proposed of extending the railway from Sceaux to the Place de Medicis.

LARGE quantities of railroad ties are being shipped to the American market from Grand Falls, N. B. The price paid for them delivered at the seaboard is $13 per 100, a much higher figure than they formerly commanded. The supply to be obtained in that section is large and not likely to be soon exhausted.

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Does Anybody Live a Hundred Years?

It will be remembered that Sir George Cornewall Lewis undertook to prove that nobody had ever lived to be a hundred years old. He contended that the reputed centenarians were persons whose history was obscure and whose births could not be verified. No one, he maintained, who had lived before the public was included in the number.

Now, on the other hand, an English physician, Dr. George M. Humphrey, brings forward the results of an extensive and rigorous investigation, which has shown that the attainment of centenarianism is by no means impracticable, not less than seventy-four persons being enumerated who have unquestionably reached or exceeded the age of a hundred years.

Nothing, for instance, could be better authenticated than the longevity of the famous French savant Chevreul, who was more than a hundred and two years old when he died last year.

In 1875, Sir Duncan Gibb recorded the case of a great-aunt of a Mr. Williams, who had sat at the head of her own table for a hundred Christmas days, having been married at the age of fifteen.

We observe that Dr. Humphrey puts faith in the extraordinary age ascribed to Thomas Parr (one hundred and fifty-two years) on the ground that William Harvey, who performed the post mortem examination, would have taken pains to ascertain the truth had he had cause to suspect than an imposition had been practiced.

In the case, too, of John Bayles, said to have been one hundred and thirty years old when he died in 1706, there is extant a medical description, with details, that satisfied the observers of the correctness of the reputed age. Outside of England there have been trustworthy examples of centenarianism not mentioned by Dr. Humphrey.

When we bear in mind the fact that the bishops of the Greek church are even more careful to register births than are the English parochial clergy, we must accept, as deserving of credence, the statement made to Sir Henry Halford, by Baron Brunow, the Russian ambassador to the Court of St. James, that there is, on the borders of Siberia, a district where a year seldom passes in the course of which some person does not die at the age of one hundred and thirty. Then, again, from official accounts of deaths in the Russian empire in 1839, it appears that there were 858 persons whose ages ranged from 100 to 105; 130 ranging from 115 to 120; and three from 150 to 156. At Dantzic, one was said to have lived to one hundred and eighty-four, and in the next year, 1840, another died in Wallachia at the last mentioned age.

In ancient times, also, there are official records of centenarianism whose accuracy it is not easy to impeach. Thus, when Vespasian made his census in A. D. 74, there were found to be, in the Roman empire, fifty-nine persons who were just a century old; 114 who were from 100 to 110 years of age; two from 110 to 125; four from 125 to 130; three from 135 to 140.

Among the distinguished persons whose age there would be abundant means of verifying, may be mentioned Fabius Maximus, who died a centenarian; Terentia, the wife of Cicero, who, according to some, lived to be 103, according to others, 112; Claudia, the wife of the Senator Aurelius, who died at 115.

It is also to be noted that on the tenth anniversary of the taking of the Bastile, Bonaparte, then first consul, received two invalid soldiers, one of 106, the other of 107 years; and that, in 1822, Pietro Huel, who was then 117 years old, and the only Frenchman living who had seen Louis XIV., assisted at the inauguration of the statue of the Grand Monarch.—*New York Ledger.*

Bicarbonate of Soda for Carbonic Acid Gas.

A well known Liverpool firm of aerated water manufacturers states, as a result of their experience, that the use of bicarbonate of soda is far preferable to and very much cheaper than the whiting process, says *The Mineral Water Trades Recorder.* The firm has given much attention to the production of carbonic acid gas, which has hitherto been almost invariably made from carbonate of lime or whiting. As a result of perfectly reliable and frequently repeated experiments it has, however, been found that by the bicarbonate of soda process a cheaper and better carbonic acid gas is obtained—a gas chemically pure and rich, as is seen in champagne wine. The difference in quality of the two gases may be demonstrated by a simple experiment. Put some bicarbonate of soda in one glass and some whiting in another; pour into each a small quantity of water; add a few drops of sulphuric acid, when effervescence will at once take place and carbonic acid gas will be generated. On smelling at each in turn, it will be found that the gas in the vessel containing whiting emits an offensive smell, while that generated in the bicarbonate of soda will be found to be perfectly inodorous. The purity of the gas made from bicarbonate of soda tells in its favor as compared with that made from whiting. Then as to the cost, the firm in question have clearly demonstrated to our representative, when he called upon them, that the carbonic acid gas manufactured by means of bicarbonate of soda is not only beyond comparison purer, but it is also very much cheaper. Experiments have been made as to the cost of one ton of carbonic acid gas, the price of sulphuric acid being £6 per ton, of bicarbonate of soda £5 per ton, and of whiting £1 10s. per ton. By the bicarbonate process the cost would be £16 12s., made up of two tons of bicarbonate of soda and one ton two cwts. of sulphuric acid. By the whiting process the cost would be £22 10s., made up of three tons of whiting and three tons of sulphuric acid. The difference in favor of the former process is thus seen to be no less than £5 18s. per ton. In addition to this, by the bicarbonate process Glauber salts to the value of £4 19s. are obtained. Deducting the cost of manufacture and packing, £1 17s. 6d., there is a balance remaining of £2 16s. 6d., which, added to the difference in favor of bicarbonate process, £5 18s., represents a total saving for the ton of carbonic acid gas manufactured of £8 14s. 6d. This will, indeed, be a matter of great consideration in the future to mineral water manufacturers.

Fluorine.

We have already given an account of some experiments of M. Moissan that permitted him to isolate fluorine. In these experiments he succeeded in splitting up hydrofluoric acid into hydrogen and fluorine. Having again taken up this study, he has been enabled to determine the constant physical principles of this new simple gaseous matter.

M. Moissan, in the first place, studied the question as to under what conditions platinum is attacked by fluorine gas. He found that at the ordinary temperature it was possible to preserve fluorine indefinitely in platinum apparatus without any fear of the metal being attacked. Moreover, he demonstrates that at a temperature of 500° or 600° there forms a bifluoride of platinum analogous to the already known chloride of the same metal. This new compound is important, since it possesses the curious property of splitting up into fluorine and platinum through heat. It is likely that when it becomes possible to prepare fluoride of platinum by an indirect way (in starting from hydrofluoric acid, for example), we shall have a chemical process for obtaining fluorine in large quantity.

After his preliminary experiments, M. Moissan took the density of fluorine. In order to obtain this gas in abundance, he modified his first apparatus by giving a much greater capacity. Beyond the electrolyzing tube he arranged a small platinum spiral, designed to condense the vapors of hydrofluoric acid carried along, and, finally, two platinum tubes filled with fluoride of sodium. This compound, in fact, retains the minutest traces of hydrofluoric acid.

The pure gas thus prepared is led into the density bottle by means of small flexible platinum tubes. This bottle is first weighed when full of air, and afterward when full of fluorine. Knowing its volume, it is easy to determine the density of the fluorine therefrom. M. Moissan determined the figure 1·26, while the theoretical density is 1·31. The slight difference between these figures well shows that pure fluorine has a normal density.

M. Moissan next determined the color of the gas. For this he used a platinum tube closed by transparent plates of fluorspar. Two platinum ajutages allowed the gas to enter and make its exit. When the tube was well filled with fluorine, the gas, on escaping through one of the ajutages, ignited crystallized silicium at the ordinary temperature.

Observing the gas, then, through the plates of fluorspar, it was found that it had a greenish-yellow color, and that the latter was paler than that of chlorine seen in the same volume. The color, moreover, differs from that of chlorine, in inclining more to yellow.

The spectrum of fluorine also was studied in detail. Upon this subject there had been nothing published except a work by M. Salet, who had compared the spectra of chloride and fluoride of silicium. M. Moissan caused a very strong induction spark to pass between gold or platinum rods in a small apparatus filled with fluorine. It is unnecessary to add that this small apparatus was itself of platinum, and that the spark could be seen through the transparent fluorspar.

On comparing the results obtained by this new method with those furnished by hydrofluoric acid, fluoride of silicium, trifluoride of phosphorus, and fluoride of carbon, M. Moissan has been enabled to demonstrate the existence of thirteen new lines, placed in the red part of the spectrum. These lines are found for the most part in the red portion comprised between the second line of potassium and the line of lithium, that is to say, in a part where no simple body has hitherto given lines. Finally, M. Moissan adds that with hydrofluoric acid he has obtained several bands in the yellow and the violet; but the position of these bands, which are not very well defined and are very wide, could not be exactly determined.

Comparing these researches with those undertaken by M. Meslans upon the fluorate ethers of the ethyl series, it will be seen that fluorine is clearly placed at the head of the chlorine family. It is colored the same as all the compounds of this family, but not so deeply as chlorine. Its density is normal, and the fluorate ethers have a boiling point less by about 50° than the corresponding chlorate ethers.

What renders these researches very curious is not only the interest attached to the isolation of the new simple matter that has been obstinately sought for for a century, but the fact that this gas is the most active matter that chemists possess. In fact, it ignites crystallized silicium, which boiling nitric acid does not attack, and which pure oxygen burns with difficulty at a high temperature; and, while chlorine is incapable of directly combining with carbon, fluorine is capable of uniting with it and forming a gaseous body—fluoride of carbon, which M. Moissan will soon describe.

Another experiment recently described further demonstrates the chemical activity of fluorine. When into the tube filled with fluorine that served to determine the color of this gas a drop of water is allowed to fall, a decomposition of the water occurs, and hydrofluoric acid forms, with a disengagement of ozone—the latter being of the characteristic blue tint that Messrs. Hautefeuille and Chapuis have demonstrated to belong to oxygen very rich in ozone. This is the sole chemical reaction that yields so concentrated ozone.

Finally, we may add that fluorine and hydrogen combine when cold and in darkness. This is the only example of two simple gaseous matters directly combining without the intervention of a foreign energy. Chlorine and hydrogen require light; hydrogen and oxygen require an electric spark or a flame; hydrogen and fluorine combine directly.

Moreover, this chemical activity has been very well demonstrated by Messrs. Berthelot and Moissan, who have determined the heat of combination of hydrogen and fluorine to be 37·6 calories, that is to say, it is greater than that of the hydroacids for iodine, bromine, and chlorine. Thus the fluorine is the most active element known at present, and on account of this very property, we maintain that it will be called upon to furnish chemists the most interesting reactions.—*La Nature.*

The Red Scale.

The red scale is as dangerous and infectious to fruit interests as small pox is among human beings. If any one wants to know what an awful thing it is, let him come down in this vicinity and visit Orange. It is a pitiful sight to see what ruin has been caused by careless indifference of the people when this pest first came into this valley. When I first saw Orange, in the fall of 1884, I thought it the garden spot of America. I never shall forget the luxuriance of the acres of orange orchards and the prosperous-looking places. There were then shipments of many carloads of oranges from Orange station every spring, and there were dozens of men who got from $2,000 to $4,000 a year for their orange crops. The red scale came there in the spring of 1885. People talked some about it, and few said the pest would be serious unless stamped out at once. Their fears were ridiculed, and every one went on in an easy, indifferent way, while the little red scale bug multiplied, spread and devoured, till at last the people saw acre after acre of orange trees dead and dying. Go to Orange to-day. Where there were hundreds of fine orchards five years ago, the land is now covered with the decaying stumps of orange and lemon trees, while in the majority of cases barley and a few vegetables are now grown where the orange orchards used to flourish. The men who enjoyed an income of $2,000 and $4,000 annually from their orange crops are now as poor as church mice and are bewailing their fate. Come here some day and see for yourself what the awful red scale has done for us.—*T. M. Rolly, in Pomona Progress.*

Uses for Old Paper.

Most housekeepers know how invaluable newspapers are for packing away the winter clothing, the printing ink acting as a defiance to the stoutest moth, some housewives think, as successfully as camphor or tar paper. For this reason newspapers are invaluable under the carpet, laid over the regular carpet paper. The most valuable quality of newspapers in the kitchen, however, is their ability to keep out the air. It is well known that ice, completely enveloped in newspapers so that all air is shut out, will keep a longer time than under other conditions; and that a pitcher of ice water laid in a newspaper, with the ends of the paper twisted together to exclude the air, will remain all night in any summer room with scarcely any perceptible melting of the ice. These facts should be utilized oftener than they are in the care of the sick at night. In freezing ice cream, when the ice is scarce, pack the freezer only three-quarters full of ice and salt, and finish with newspapers, and the difference in the time of freezing and quality of the cream is not perceptible from the result where the freezer is packed full of ice. After removing the dasher, it is better to cork up the cream and cover it tightly with a packing of newspapers than to use more ice. The newspapers retain the cold already in the ice better than a packing of cracked ice and salt, which must have crevices to admit the air.

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STAINED GLASS AND OBJECTS OF WIRE CLOTH.

A little stained glass work judiciously distributed imparts a bright and cheerful air to the house by introducing a few brilliant colors in a legitimate way, where they would be entirely out of place if introduced in draperies, carpets, or furniture.

It is an easy matter to make stained glass work after the more simple designs. It only requires a knowledge of the use of the glazier's diamond, or the very efficient

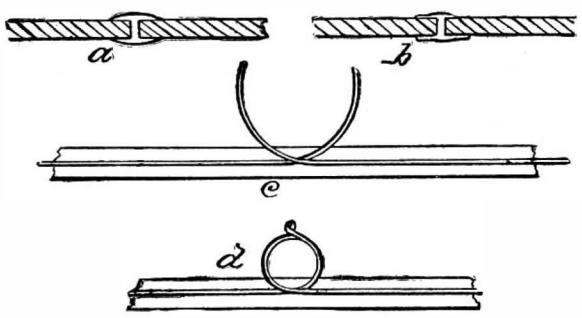

Fig. 1.—DETAILS OF THE LEAD WORK.

substitute for the same known as the roller glass cutter, and some proficiency in the use of the soldering iron.

The colored glass can be procured from almost any dealer, and for the grooved lead strips in which the glass is set, the amateur will have to depend on the stained glass works. Some manufacturers are willing to furnish it in small quantities, while others are reluctant. It is to be regretted that there is no simple way of making these strips. Every stained glass manufacturer is provided with a machine by means of which he rolls them from larger strips of about the same form, made at the lead works, and known as cames.

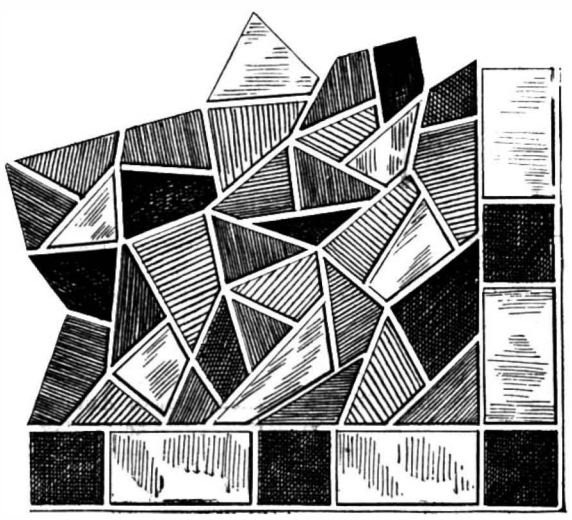

Fig. 2.—STAINED GLASS WORK "CRAZY" PATTERN.

Two kinds of lead strips are generally used in this kind of work, one of which is shown at *a*, in Fig. 1. This is narrow and convex, and well adapted for small curves, circles, etc. The other, shown at *b*, in the same figure, is wider and thinner and better adapted for straight work. At *c*, in the same figure, is shown the method of attaching copper wires to the lead for twisting around the rods which support the work, as shown at *d*.

A drawing of the pattern is made upon stout paper, and the work is begun by cutting the glass according to the pattern, fitting the lead strips and soldering* them at their junction. After all of the glass pieces have been fitted and secured, the work is turned over and soldered upon the other side. The wires are then attached by first tinning them and then securing them by means of solder. These wires are twisted around iron rods, which are so arranged as to support the work. Small pieces will not require the iron rods, but larger ones are liable to sag and buckle of their own weight. They are also apt to be blown out of shape by a heavy wind. The easiest pattern to produce on stained glass is that shown in Fig. 2. It is hardly worthy of classification among patterns, but it is pleasing if properly done. Some care is necessary to secure harmony of color, but there is little chance of failure in this kind of work.

* For the soldering, an ordinary soldering iron is employed, and common tinner's solder is used in fastening the joints. Tallow is used as flux. A tallow candle is commonly employed for this purpose. The joint to be soldered is rubbed with the end of the candle, and the solder is applied. Of course the iron must be well tinned and hot, and the touch of the iron upon the work must be very quickly and dexterously done.

It is a common practice to gild over the lead strips after the work is done, by means of gold paint, but it is a question whether it is any improvement over the natural color of the lead, especially in work exposed to the action of the elements. For some indoor work, such as fire screens, sash screens, lanterns, lamp shades, etc., the gilding is not objectionable.

The screen shown in Fig. 3 is not difficult. All of the glass pieces are of such form as to be easily cut, and the work of joining the lead strips is quite simple. As to colors, it would be well to follow the example of nature, or in any case to select such as will harmonize. It is hardly possible to produce more gorgeous coloring than is found among the butterflies. Green, blue, greenish-blue, red, yellow, brown, black and white (opalescent) are colors from which to select for this object.

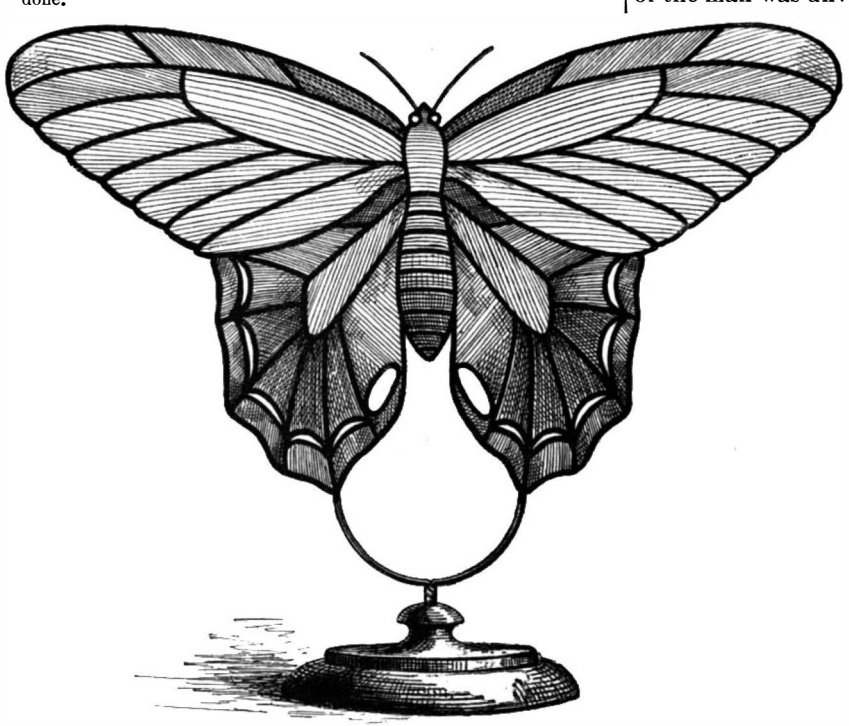

Fig. 3.—DESIGN FOR STAINED GLASS LAMP SCREEN OR FIRE SCREEN.

The wire frame which supports the glass is carried along the lead strips and secured by solder. The antennæ are of wire. The base is of wood, neatly stained and polished.

A class of ornamental objects may be made from wire cloth which rival in beauty any kind of stained glass work. Figs. 4 and 5 are examples of this kind of work.

The wire cloth for this purpose should be made of fine wire, the mesh should be coarse, say 10 to the inch, and, moreover, the cloth should be painted and allowed to dry before the ornamental work is applied. The wire cloth is supported a short distance from a design drawn on paper and the different colors are introduced into the meshes by means of an ordinary writing pen. A gelatine solution is used for this purpose. It should not be very thick, and it must be kept warm. Ordinary transparent gelatine may be colored for this purpose by adding aniline. Colored lacquers answer admirably for filling the squares. Common white glue answers very well for filling the body of the design. The beauty of this kind of work and the simplicity of the method by which it is produced recommend it for many purposes.

The construction of the frames for the lamp shade and hanging lantern requires some mechanical skill. Probably the aid of the tinsmith will have to be invoked in these cases. It will pay, however, as the articles will well repay the trouble and expense.

The hanging lantern, Fig. 5, is designed for a hall. It may contain a kerosene lamp, or the device known as the "fairy lamp," in which a large candle is employed as a source of light.

The colored checks in the wire cloth appear like gems when illuminated.

Monument to Seth Boyden.

In honor of Seth Boyden and in memory of his distinguished services in promoting mechanical industries in the city of Newark, N. J., a handsome monument of the man was unveiled in Washington Park, Newark, N. J., on Wednesday, May 14. R. Wayne Parker, President of the Newark Board of Trade, presented the statue to the city. Mayor Joseph E. Haynes received it on behalf of the municipality. The oration was delivered by Chancellor Runyon, who enumerated the inventions of Seth Boyden, some of which were improvements in the manufacture of leather.

By analyzing the coating or varnish of a piece which had been presented to him, he in a short time discovered the process and produced an article better than that which had been exhibited to him.

This was the origin and he the originator of that great business in this country, a manufacture in which the city of Newark is pre-eminent and the products of which it sends to every part of the globe and in which it commands the market. Mr. Boyden made no attempt to secure to himself the benefit of his discovery, but gave it to the world. His merit and his generosity in the matter were recognized, thirty years after he sold out and left the business, by those who had profited by them, and on their testifying such recognition to him (about 1863) he said: "I introduced patent leather, but it should be remembered that there was nothing generous or liberal in its introduction, as I served myself first, and when its novelty had ceased and I had other objects in view, it was the natural course to leave it. When I had done so, and other more active and enterprising persons chose to supply the wants of the public, I wished them all prosperity, and am happy to see it, to see patent leather useful and valuable and a business of the first magnitude, and to see a friendly social feeling existing among all interested. May it be as enduring as the use of leather."

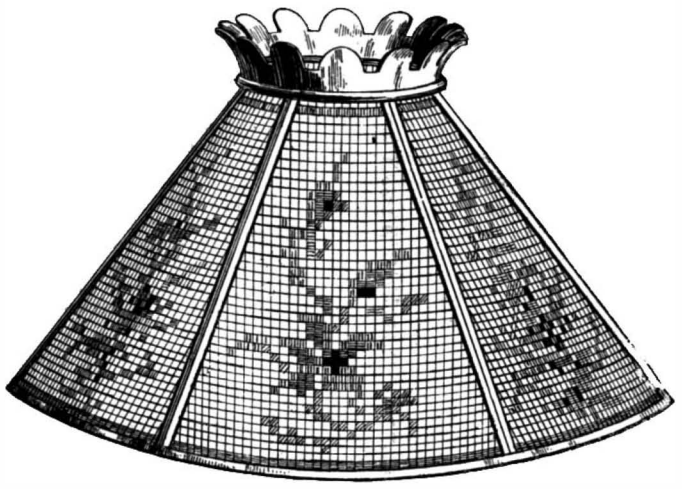

Fig. 4.—LAMP SHADE.

Mr. Boyden died March 31, 1870, aged 82 years. The versatility of his genius, says the *Shoe and Leather Reporter*, was remarkable. He entered many fields of effort, differing widely from each other. He manufactured locomotives and invented delicate optical instruments; repaired watches at the age of fifteen, and produced a telescope of great power; by skillful cultivation he increased the size of the variety of strawberries which bears his name beyond that of any other kind; he improved on Daguerre's process of producing sun pictures, and discovered a method of manufacturing Russia sheet iron. His life seemed to be a refutation of the "jack at all trades" axiom, for he was an adept at everything to which he turned his hand.

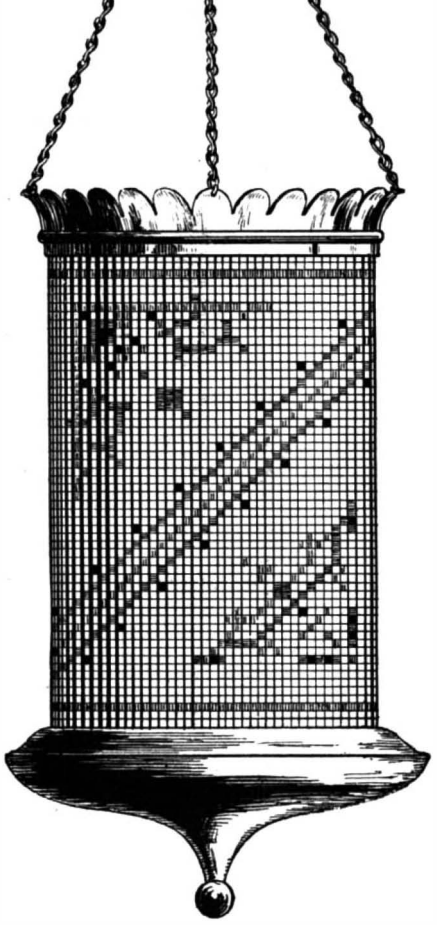

Fig. 5.—HANGING LANTERN OF WIRE CLOTH.

IT takes about three seconds for a message to go from one end of the Atlantic cable to the other.

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RECENTLY PATENTED INVENTIONS.

Railway Appliances.

CAR COUPLING.—Joseph Rigby and George W. Reed, Seattle, Washington. In this coupling a spring-seated block is arranged to slide in the throat of the drawbar and hold the pin up until the block is forced in by the entering link, when the pin drops to couple the cars, the device insuring greater smoothness and certainty, and its working being definitely under the control of the operator.

CAR AXLE.—Charles W. Wolfe, Albany, N. Y., and Thomas H. Campbell, Green Island, N. Y. This is a sectional axle with wheels capable of independent rotation, so that a car supported by them will round curves of shorter or longer radius to either side, materially reducing friction and wear of railway equipment, the invention covering various novel features of construction and combinations of parts.

RAIL SWEEPER.—Neil Campbell, New York City. Two sweepers are ordinarily employed upon each car, one at each end diagonally across the track, and capable of attachment to the bottom of any car, the construction being designed for convenient manipulation to engage or disengage the sweeper with or from its driving mechanism and the track, the sweeper being driven directly from the wheels of the car or axle.

GONDOLA CAR.—Thomas Watkins, Coal Bluff, Pa. This is a car primarily designed for the transportation of coal, coke, ores, etc., and for the quick and easy unloading of the contents of the car without the labor of shoveling, the invention covering various novel features of construction and combinations of parts.

ELEVATED RAILWAY.—Thomas C. Clarke, Shrewsbury, N. J. This invention consists of a longitudinally-extending triangular girder, with side brackets projecting therefrom at suitable intervals and serving to support the double tracks, the construction being designed to take up but little room in the streets, and not seriously obstruct the passage of light and air.

Electrical.

BILGE WATER ALARM.—James W. Jones, New York City. This device consists of a float having an electrical contact point, an electrical signaling apparatus, and a fixed contact point, against which the float contact point bears when the water rises above a certain predetermined height, whereby an alarm will be sounded.

TELEGRAPH KEY.—John S. Kaylor, of Bismarck, Ill. Combined with the leg and contact point of the key is a sliding bolt, spring contacts forming a positive electrical connection therewith, with a spring for moving the bolt forward into the leg and a curved switch lever for withdrawing it, whereby the switch will not be liable to be opened accidentally, and will close automatically when released.

Mechanical.

GAINING MACHINE.—Joseph W. Baker, Chatham, Pa. This is a machine especially adapted for use in the formation of the gains in the string pieces or jacks of a stairway, movable clamps providing for the adjustment of a bed plate or frame to bring the cutter head to a position to operate to form either the tread or riser gains.

SAW FILING AND SETTING MACHINE.—William H. Parry, New York City. This is an improvement in machines which have a saw that is alternately clamped and released and moved the distance of one tooth during the reciprocating movement of a file holder that slides in a guideway adapted to vibrate in a vertical plane, the invention covering various novel features and combinations of parts.

Agricultural.

PLANT PROTECTOR.—Henry T. Shepherd, Bentonsport, Iowa. This device consists of a wire screen cover adapted to wholly inclose the plant to protect it from the ravages of insects, without excluding the sun, air, and moisture, the protector being readily anchored in place, and designed more especially for use over melons, to protect them from bugs and cutworms.

Miscellaneous.

SPONGE HOLDER.—Burchard H. A. Siefken, Omaha, Neb. This is a device which will maintain an upright position, whereby the sponge will the longer retain its moisture, and be prevented from coming in contact with books, papers, or other articles, while it has a cap, so that it can be carried in the pocket without any leakage of water.

LEG FOR FOLDING BEDS.—Frederick Bennett, New York City. This is a leg so arranged that upon lowering the bed it will fall by gravity to the proper position for supporting the bed and be securely locked, and upon elevating or closing the bed will fall back to full concealment, the invention covering various novel features of construction and arrangement of parts.

HEAD AND BACK REST.—Charles Gurney, Piffard, N. Y. This is a portable device, consisting of a casing with an opening in its back, a spring-pressed plate being mounted in the casing with an arm hinged to the plate, and is designed more especially for use with a railway car seat, the parts being adapted to fold compactly and so designed that they may be brought to fit the person of almost any user.

PICTURE NAIL.—Aloysius Hauger, New York City. This is a nail in which the head portion is hinged to the body or stem, and adapted to fold toward the stem and unfold therefrom, whereby the stem may be driven into a wall or support without danger of injuring the head.

WINDOW CLEANER.—Francis Redmond, Ranelagh, Dublin, Ireland. This an improvement in window cleaners having a rotary brush, pad, or mop, carried by a handle with mechanism for operating the rubber by hand, the improvement being designed to facilitate the work without weakening the support of the rubber.

LAMP BURNER.—Thomas Wall, Brooklyn, N. Y. This is a burner in which the parts are firmly secured together without the use of solder, and at small cost, a novel form of die and plunger being employed, and the invention covering other special details of construction and combinations of parts.

DRAWER EQUALIZER.—Joseph H. Knaus, Fayette, Mo. This invention covers a peculiar arrangement of links and levers joined together after the manner of toggle levers in the rear of the drawer, for securing its even and regular movement, and so that when pulled from one side or the other it will not be liable to become cramped or jammed.

LABYRINTH PUZZLE.—William F. Trulsen, New York City. This is a shallow rectangular box in which fits a sheet metal piece with stamped ribs forming groups of grooved passages, of which only one correct passage leads from a central recess to an exit opening near one corner of the box, a ball being adapted to traverse the passages and escape therefrom.

HYDROCARBON BURNER.—John Adams, Nashville, Tenn. Three patents in this line have been granted to this inventor, one of which more especially covers a burner designed for heating stoves, another for a burner for use in cooking stoves, and adapted to burn a mixture of petroleum or other liquid hydrocarbon and steam, these burners being designed for use in the fire-pot of an ordinary stove, while the third invention is intended to adapt the burner to a wider range of use where it is desirable to establish a forced draught by compressed air or steam.

NON-CONDUCTING COVERING.—Joseph L. Stillman, Fresno, Cal. This is a covering for pipes, to prevent freezing or loss of heat, and is composed of felt, red flannel, Osnaburg cloth, and paper, arranged in layers, with a special composition incorporated between the layers.

COAL MINING MACHINE.—William Job, Columbus, Ohio. This machine consists of a traveling adjustable frame mounted on swiveled rollers, and having a drill and cutter, adapted to drill a hole and then cut a seam laterally therefrom in such way that the blocks of coal detached from their place in the seam may be readily removed.

LOCK.—Charles E. Hennies, Atlanta, Ga. The bolt of this lock has notches in its upper and lower edges, with a spring-actuated tumbler adapted to hold the bolt in an unlocked and partially locked position, a spring-actuated stop holding the bolt in a locked position, while the tumbler, stop, and bolt are so constructed that two keys are necessary to lock and unlock them, and these keys must be manipulated in a definite manner.

WEIGHT AND PRICE SCALES.—Joseph T. Bright, Lexington, Ky. In these scales a tilting graduated beam is connected with a lever under the platform, and operates other levers on which the platform rests, the weight that slides on the beam being adjusted to indicate the value of the quantity of the article desired, while a dial pointer is adjusted by a screw to indicate the amount in pounds.

FILTER.—Charles G. Purdy, Brooklyn, N. Y. This invention covers a packing or joint for filter tubes, consisting of a central elastic apertured disk and two apertured guard plates at each side thereof, all adapted to an opening in a partition separating the unfiltered and filtered fluid chambers of a filter, and to make a joint with the filtering tube nozzle.

CARPET CLEANING MACHINE.—William Bowman, Battle Creek, Mich. This invention consists of a revoluble case or carrier formed with a number of pockets and provided with retainers, to prevent the bunching of the carpets placed in the machine and provide for a proper action in connection with each carpet.

MUCILAGE DISTRIBUTER.—Magnus J. Palson, Gloucester, Mass. This is a vessel having a small eduction port, connected with which is a spring spreader, carrying a rubber packing normally closing the port, whereby mucilage, glue, or paste held in the vessel may be delivered by simple pressure and evenly spread upon the parts to be connected.

TYPEWRITER CABINET.—John E. Davis, Washington, N. J. This invention consists of a supporting shelf pivotally connected at one end to the desk, rollers or blocks on the desk supporting the shelf in a closed or extended position, whereby the machine may be conveniently supported for use and inclosed when not in use, the cabinet then forming a writing desk.

PIANO.—Arthur W. Davidson and Charles Sigmund, Philadelphia, Pa. This is an improvement in the construction of upright pianos, providing means whereby the pin block will be securely attached to the back timbers or bracings of the instrument, and also to utilize the attaching mediums as conductors and transmitters of sound, tubular or trumpet-shaped bolts being used.

CLOTHES HANGING APPARATUS.—James A. McMahon, Brooklyn, N. Y. This invention relates to apparatus on the inside of the window, and used with a movable endless line running over pulleys and extending to a point outside of the house, the garments being hung on the line inside of the window and prevented from being soiled in passing over the window sill, while danger from leaning out of the window to handle the line is avoided.

DUMPING CART.—Charles Gibbs, New York City. This cart has a bottom pivoted to it at its rear end and is provided with a hoisting mechanism at its front end, with other novel features, whereby the load may be dumped quickly and conveniently while the body of the cart remains in its horizontal position, the end gate not being opened and the operator remaining at the front of the cart.

NEW BOOKS AND PUBLICATIONS.

CYCLOPÆDIA OF THE MANUFACTURES AND PRODUCTS OF THE UNITED STATES. New York: The Seeger & Guernsey Company.

This is a very large classified trade directory, designed to afford the address of a manufacturer, and in most cases a long list of manufacturers, of almost any article a customer might be looking for. The index to articles fills 173 closely printed pages, and the directory proper 855 pages, the classification being so thoroughly carried out that it is easy to find any general description of goods or any special and limited subdivision thereof.

THE AMERICAN NEWSPAPER DIRECTORY. New York: George P. Rowell & Co. Pp. 1452.

This is the twenty-second year of publication, by a leading firm of advertising agents, of an annual volume giving location, size of sheet, and subscription price of all the newspapers in the country. Great care has been taken to make the work as complete as possible, and to give the best information obtainable relative to the circulation of each publication.

L'ANNEE ELECTRIQUE. Paris: Baudry et Cie. 1890. Pp. viii, 381.

Under eleven different headings forming the titles of as many chapters the history of electrical work for the year 1889 is given in this work. The electrical world is in a state so typically one of transition and development that these annual records of invention and discovery, embodying a summary of the world's progress in the science, are of the greatest utility, and should be studied by all. The last chapter on necrology brings to us the recollection of the losses of the year: Gaston Plante, the inventor of the storage battery; L. Gaulard, celebrated as one of the originators of the distribution of electricity by the converter system; J. P. Joule, the great physicist and investigator of the thermo-mechanical laws and relations, being among the most eminent.

THE PASTOR'S DAUGHTER. By W. Heimburg. Translated by Mrs. W. J. Davis. New York: Worthington & Co.

THE FEET OF LOVE. By Anne Reeve Aldrich. New York: Worthington & Co.

These are beautifully printed and bound novels with which to while away a summer hour agreeably. They are each embellished with good specimens of photogravure illustrations.

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MAY NUMBER.—(No. 55.)

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13. Cottage at Greenwich, Conn., erected at a cost of $7,250 complete. Floor plans and perspective.
14. Miscellaneous Contents: High buildings.—Bad flues.—Imitation ebony.—Destruction of asphalt pavement by gas.—Art of building.—Improved dumb waiters, illustrated.—An improved skylight, illustrated.—Rogers miter planer, illustrated.—Dumb waiters and hand power elevators.—A fine window in the Convent of the Sacred Heart, illustrated.—Improved sash pulleys, illustrated.—A hot air and hot water heater, illustrated.—Colors for mortar.—Improved adjustable grooving head, illustrated.—An improved window screen frame, illustrated.

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Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Laight and Canal Sts., New York.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(2235) C. W. asks: 1. Can blue ferroprussic prints be tinted gray or green, or can prints be made in any tint on the same principles by simple water manipulations? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 584. 2. How can I varnish or give a glazy look to engravings, cardboard, etc., which will be pliable and elastic? A. Spread over the prints with a brush a collodion varnish. To 32 parts of collodion add 1 part of castor oil. 3. Is there any cheap, easy, and quick method of making ink prints direct from negatives or from films? A. No. See book, "Practical Guide to Photographic and Photomechanical Printing," by W. K. Burton, price $1.50.

(2236) A. H. asks: 1. Can you give me the process by which the wax upon the Edison phonograph cylinder is hardened? A. The composition is a secret. 2. Is there any known solvent for carbon? A. Melted iron and some other metals. 3. Is it possible to conceive an indivisible particle of matter? A. This probably passes comprehension, and can only be affirmed as a definition. 4. What works do you consider the most complete upon physics? A. We recommend and can supply Hopkins' "Experimental Science," price $4. Ganot's "Physics," $5. Ganot's "Natural Philosophy," $3.

(2237) H. G. L. writes: Please give me a simple test for phosphate of lime. A. Dissolve the mineral in nitric acid and add a drop to several cubic centimeters of a nitric acid solution of ammonium molybdate. A yellow precipitate indicates phosphoric acid. The test is interfered with by the presence of silicic or arsenic acid. These will not be apt to trouble you. Natural phosphates generally are accompanied by calcium carbonate.

(2238) W. V. B. asks how dextrine should be treated to eliminate the disagreeable odor it always has. A. Dissolve 10 parts dextrine in 18 parts water. When it has become clear, decant or siphon off, and mix the clear solution with 1½ to 2 per cent of 95 per cent alcohol. Decant the liquid from the precipitated dextrine, which will be dissolved in water and evaporated to dryness. Or dissolve in water and filter through animal charcoal.

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(2239) C. E. B. asks how to make soap from the soap tree bark. A. Use the powdered bark infused in water. No preparation is needed.

(2240) J. D. J. writes: 1. I have made some ink for reinking typewriter ribbons, as per receipt taken from SCIENTIFIC AMERICAN, and while it works all right apparently at first, it gets too dry in a few days for use; when I put in more castor oil, then it makes it too greasy. The receipt read to take any aniline dye and dissolve it in alcohol, and thicken with castor oil. Can you give me the proper proportions of each? I find my ribbons dry out too soon, and when I add more castor oil, I get it too greasy. A. Try the addition of a little vaseline to your ink. We cannot give absolute proportions. In many cases vaseline is recommended as the body. 2. Will you please tell me what to add that will make it copy in the press? A. For such a copying ink dissolve an aniline color in a little alcohol, and mix with glycerine. 3. Will you give receipt for making first-class writing and copying fluid—black and blue black? A. In general, three volumes of a good ink of desired quality may be mixed with one volume of glycerine. An aniline color may be used as the basis, but will be liable to fade. For a black gall ink macerate 1 pound crushed galls in ¾ gallon of water poured on while boiling. Strain, and add a solution of 5½ ounces of copperas and 3 ounces of gum arabic dissolved in ¼ gallon of water. Add a little oil of cloves as an antiseptic. This gives a plain black ink. To make it blue black, add a strong solution of soluble Prussian blue. Mix either of these with glycerine as described above.

(2241) E. H. S. asks (1) of what and how is plaster of Paris made? A. It is made from gypsum, a natural mineral, a hydrated calcium sulphate ($CaSO_4.2H_2O$). The mineral is ground and heated until part of the water is expelled. 2. Has it any relation to alabaster? A. Alabaster is a variety of gypsum.

(2242) J. C. B. asks: 1. Please inform me of the best way of converting sulphite of lead combined with linseed oil into metallic lead? A. Heat in a crucible with a few iron nails or wire scrap, powdered charcoal and carbonate of soda. 2. And also any book which will treat on this subject. A. Books on assaying, such as Keil's "Assayer's Manual," $3, or on metallurgy, such as Overman's "Metallurgy," $5. 3. Also how to test white lead for the amount of oil contained in it? A. Treat with bisulphide of carbon until oil is all dissolved out, and weigh the residue.

(2243) P. H. G. writes: What is the best known mixture of minerals which, when in a hard form, will ignite when exposed to the air, and burn for any length of time? A. Lead pyrophorus, made by heating tartrate of lead in a glass tube, ignites when exposed to the air. Iodine and phosphorus placed in contact ignite in a few minutes. Finely divided iron mixed with sulphur and moistened may inflame spontaneously. In the first and last of these cases the combustion is flameless.

(2244) A. J. G. asks (1) if there is anything better than shellac for covering the metallic part of a static battery to prevent loss of electricity. A. No. A good quality of shellac is the best substance known for this purpose. 2. Which kind of glass, plate or common, is preferable for making wheels for a static battery? A. For small machines common sheet glass, for large machines plate glass. 3. Would like to know what is meant by burnt plaster, also what sort of material is meant by Greek pitch? A. Calcined plaster of Paris and mineral pitch. 4. Is the static battery known as the Wimshurst machine patented? A. We think not. 5. Of what advantage are the equalizing rods on the Holtz-Toepler battery? A. They neutralize the charge on the plate at the points of contact.

(2245) A. T. O. asks how to prepare Javelle's water. A. Mix 80 parts chloride of lime with 400 parts of water in a covered vessel. Dissolve 100 parts carbonate of potash in 400 parts water (boiling). Pour last solution into first as quickly as possible, and cover. When cold, dilute to 1,000 parts.

(2246) J. J. F. says: There is a diversity of opinion between our engineers in regard to method of holding a high steady pressure with a hot fire. One holds that if any door should be open, it should be the furnace door, as it causes less contraction, and therefore causes least injury. The other, that the flue doors in brickwork should be opened and furnace doors closed, thereby causing less contraction. A. It is the practice among our best engineers to use the chimney damper, the fire door and the ash pit door, with discrimination as to economy and the best regulation of steam. When the engine is running regularly, the damper should do the whole work of regulation for steam pressure. The fire door should only be used for feeding fuel and the sudden necessity of checking steam generating, when engines are suddenly stopped. The ash pit door is not needed when there is a good damper regulator. If there is no damper, the flue door may be used as a regulator, but is not recommended.

(2247) W. S. H. asks if there is any way to varnish or coat a copper boiler in the kitchen, connected with a range, so as to keep it bright and avoid the weekly scouring and the use of so much "elbow grease"? A. Shellacking or the application of gum sandarac varnish might answer. For all these applications the surface must be absolutely clean.

(2248) J. W. E. asks a cheap preparation for deodcrizing coal oil, that could be mixed with turpentine and paint. A. An attempt at deodorizing coal oil may be made by agitating it with concentrated sulphuric acid, leaving bichromate of potash in solution, allowing it to settle and decanting. This mixture cannot be mixed with vegetable or animal oils, and the coal oil must be carefully freed from it, as by washing with water or weak soda solution, before use.

(2249) M. H. asks how lead pipe is run when run in long lengths of say one mile? It is the core which bothers us. A. Lead pipe is made by forcing the lead through a die in the axis of which is supported a mandrel, leaving an annular space through which the lead passes while still hot but congealed. The different charges of lead weld together under the heat and pressure, making the issue of pipe in a continuous length as long as the machine can be run, many miles if necessary.

(2250) C. H. asks: What kind of metal is best to use for a mercury trough, to be used for electrical connections? A. Use iron or copper if you desire to make connections through the containing vessel. Vulcanite answers well where the connections are made through the mercury alone.

(2251) O. F. N. asks: What foreign substance is dissolved in the water or oil into which the heated steel is immersed, in order to prevent said steel from drawing out of shape and breaking? A. There is nothing that can be put in the water that will prevent warping in hardening. The whole secret is in the manner of dipping, which should be such that the cooling should take place all around, or in a plane at right angles to its longer axis. A spindle or long top should be dipped in a vertical position. Cracking is often a mystery, but is more often the result of inattention to the quality of the steel and overheating. No steel should be heated too fast, nor any hotter than is absolutely necessary to harden it. This is a good workman's experience, and his secret, *i. e.*, to know just how hot and how fast to heat every grade of steel and every form of tool.

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May 13, 1890.

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

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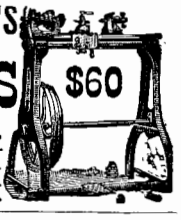

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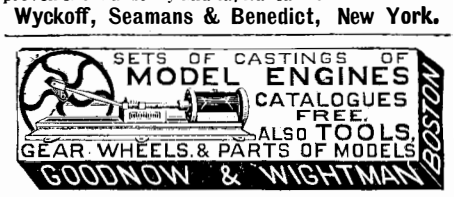

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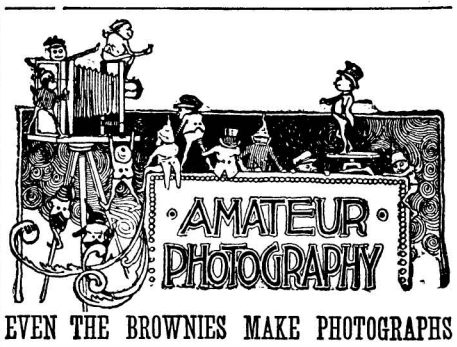

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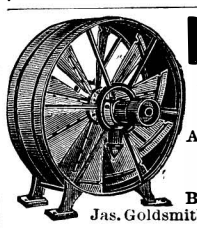

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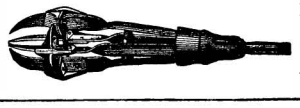

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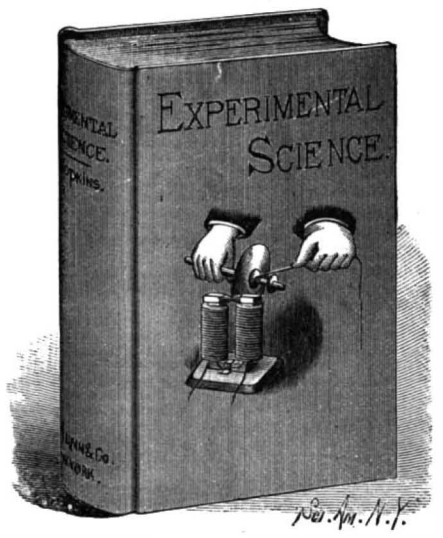

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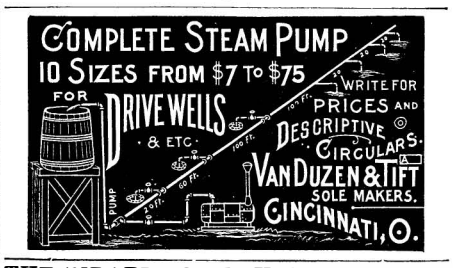
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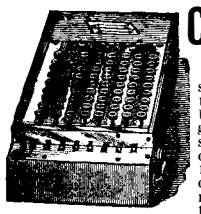

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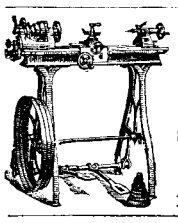

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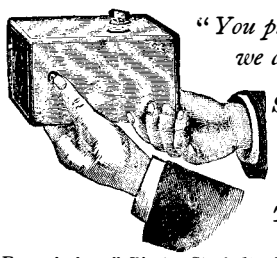

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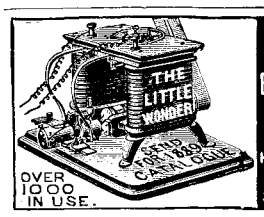

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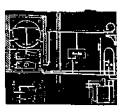

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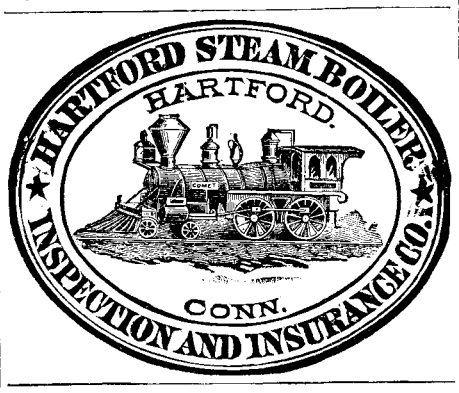

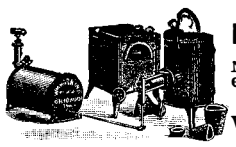

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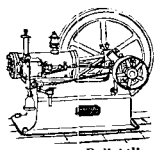

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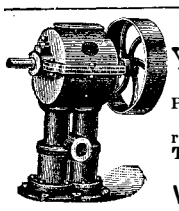

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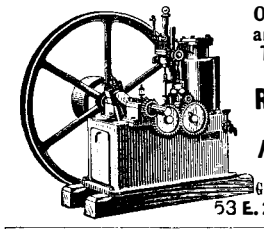

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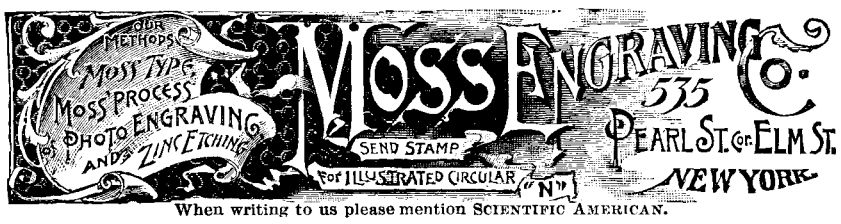

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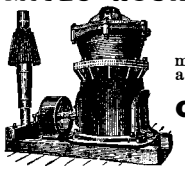

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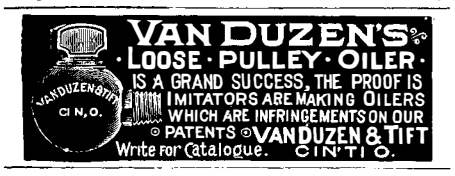
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